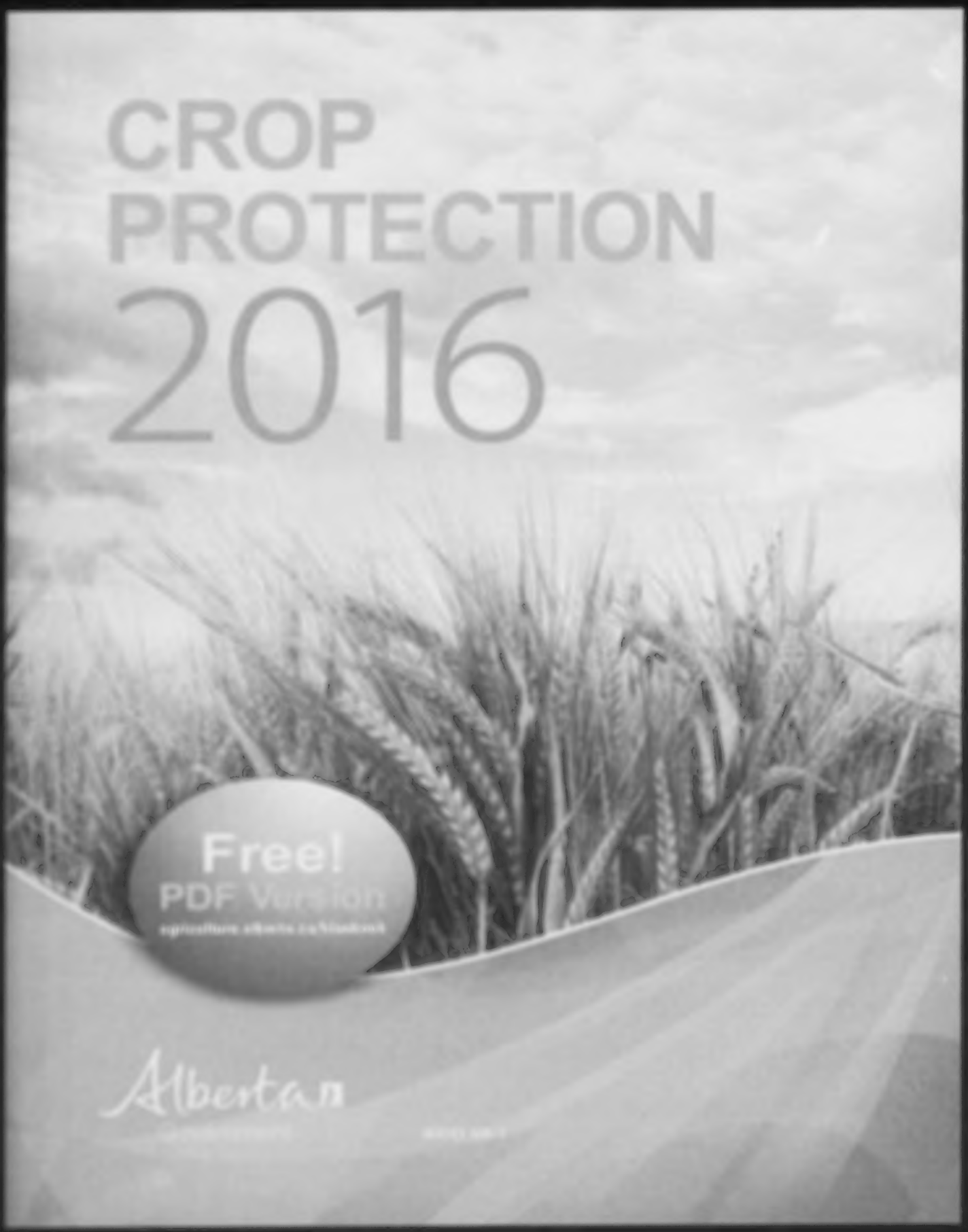
CROP PROTECTION 2016



Alberta

Disclaimer

This publication is intended to be used as a guide only. Information contained here is that available at the time of printing (February 2016). While every effort has been made to ensure accuracy, Alberta Agriculture and Forestry does not accept responsibility for label changes, errors in conversion or otherwise. It remains the responsibility of the readers to follow product information contained on the product label or package insert. The publisher, editor and all contributors to this publication cannot be held responsible for publication errors or any consequence resulting from the use of this publication.

Note: Some approved minor use registrations may not appear on the product label. Check with product write-up for details.

All recommendations in this publication are given in quantity of commercial product per acre (L or kg/ac). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors, be sure to read and understand label recommendations.

Warning
The use of a pesticide in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act* and Alberta's *Environmental Protection and Enhancement Act*.

Questions or concerns, contact:

Alberta Ag-Info Centre
Phone: 310-FARM (3276)

Copies of this publication may be obtained from:

Publications Office
Alberta Agriculture and Forestry
Phone: (780) 427-0391

or

see the website <www.agriculture.alberta.ca> for information on other publications, videos and CD-Roms

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CROP PROTECTION 2016

Edited by

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Alberta Agriculture and Forestry

in co-operation with the agro-chemical industry

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Address and Telephone Numbers

Chemical Companies

ADAMA Agricultural Solutions Canada Ltd.
302 - 179 McDermot Avenue
Winnipeg, MB R3B 0S1
Toll Free: 1-855-264-62h2

Adjuvants Plus Inc.
1755 Division Road North
Kingsville, ON N9Y 2Y8
Toll Free: 1-877-512-4659

AgraCity Crop andNutrition Ltd.
320 22nd Street East
Saskatoon, SK S7K 0H1
Toll Free: 1-306-665-4548

AgraCity Crop and Nutrition Ltd.
320 - 22nd Street East
Saskatoon, SK S7K 0H1
(306) 665-4548

Arysta LifeScience Canada, Inc.
998, 105 - 150 Crowfoot Crescent N.W.
Calgary, AB T3G 3T2
Toll Free: 1-866-761-9397
Fax:1-866-231-8957
Website: arystalifescience.com

BASF Canada
100 Milverton Drive, 5th Floor
Mississauga, ON, L5R 4H1
(416) 675-3611 Toll Free: 1-877-371-2273
Website: www.agproducts.basf.com

Bayer CropScience Inc.
#200, 160 Quarry Park Blvd..SE
Calgary, AB, T2P 3G3
1-888-283-6847
Website: www.bayercropscience.ca

Chemtura Co.
25 Erb Street
Elmira, ON N3B 3A3
1-800-350-1745

Dow AgroSciences Canada Inc.
#2100, 450 - 1 Street S.W.
Calgary, AB T2P 5H1
Toll Free: 1-800-667-3852
24 Hour Emergency: 1-613-996-6666
Website: www.dowagro.ca

E.I. duPont Canada Co.
4444 - 72 Avenue S.E.
Calgary, AB T2C 2C1
Toll Free: 1-800-667-3925
Website: www.dupont.ca/ag

Engage Agro Corporation
1030 Gordon Street
Guelph, ON N1G 4X5
(519) 826-7878 Toll Free: 1-800-900-3497
Website: www.engageagro.com

FMC of Canada
Box 32033
Erindale, Saskatoon, SK, S7S 1M7
Phone (306) 979-9225
Website: www.fmccrop.ca

Gowan Company

PO. Box 5569
Yuma, AZ 85366-5569
Toll Free: 1-800-833-5720
Website: www.gowanco.com

Interprovincial Co-operative Limited
945 Marion Street
Winnipeg, MB R2J 0K7
(204) 233-3461
Website: www.ipco.ca

Loveland Products Canada Inc.
789 Donnybrook Drive
Dorchester, ON N0L 1G5
Toll Free: 1-800-328-4678

Monsanto Canada Inc.
67 Scurfield Blvd.
Winnipeg, MB R3Y 1G4
Toll Free: 1-800-667-4944
Website: www.monsanto.ca

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Nexus Concepts Inc.
P.O. Box 31097
Guelph, ON N1H 8K1
(519) 821-3110
24 Hour Emergency: (613) 787-1620
Website: www.nexusconcepts.com

Nufarm Agriculture Inc.
5107 - 1st Street S.E.
Calgary, AB T2H 1H9
Toll Free: 1-800-868-1444
24 Hour Emergency: 1-800-424-9300
Website: www.nufarm.ca

Peacock Industries Inc.
Box 750
Hague, SK S0K 1X0
(306) 225-4691
Website: www.grasshopperoutrol.com

Syngenta Crop Protection Canada Inc.
#300, 6700 MacLeod Trail South
Calgary, AB T2H 0L3
Toll Free: 1-877-964-3682
24 Hour Emergency: 1-800-327-8633
Website: www.syngenta.ca

UAP Canada Inc.
789 Donnybrook Drive
Dorchester, ON N0L 1G5
Info Line: 1-800-561-1444
24 Hour Emergency: 1-800-561-8273
Website: www.uap.ca

Valent Canada, Inc.
307 Woodlawn Road West, Suite 302-B
Guelph, ON N1H 1B4
(519) 822-7043
www.valent.ca

Alberta Pest Surveillance System Information Line: 310-2777 (APSS)

The information line is available to assist with the following:

- provide advice and information to producers and other stakeholders regarding pest identification and pest concerns
- refer relevant information via literature or specialists in pest management
- aid in developing a database that will allow pest concerns to be monitored and assist in making informed pest management responses

For pest related concerns, contact 310-2777 (APSS).

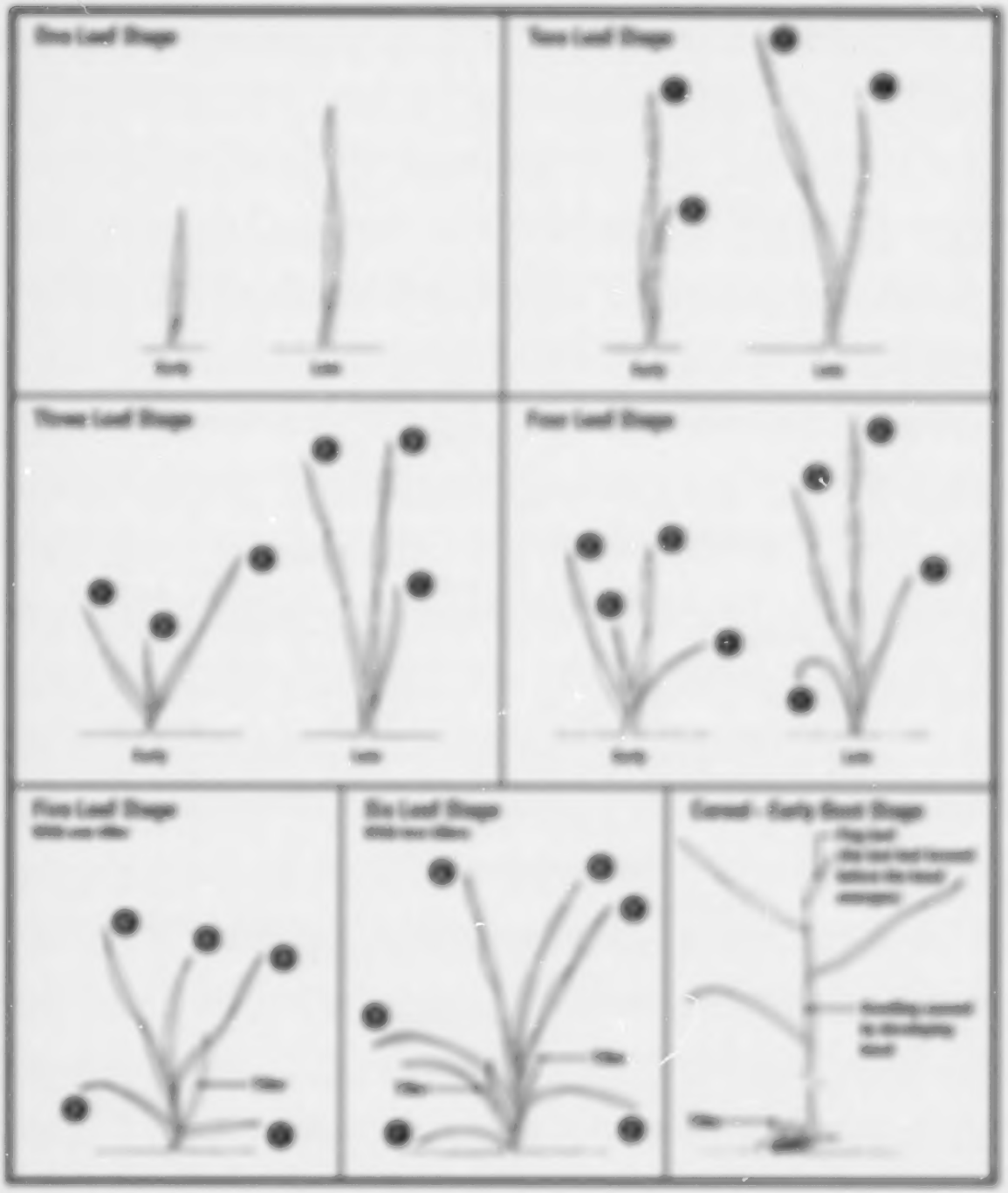
Pest Management Regulatory Agency

The Pest Management Regulatory Agency (PMRA) of Health Canada is responsible for providing safe access to pest management tools, such as pesticides and sustainable pest management strategies, while minimizing risks. The Agency registers all pest control products that may be used in Canada. If there are questions or inquiries regarding pesticides, product labels or safety precautions, contact PMRA at the following telephone numbers:

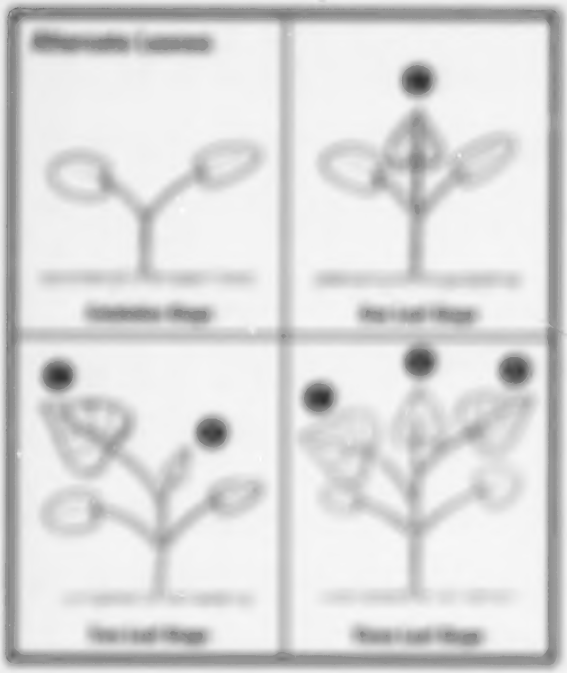
Edmonton 780-495-7014 **Calgary** 403-292-4301 **Lethbridge** 403-382-4704

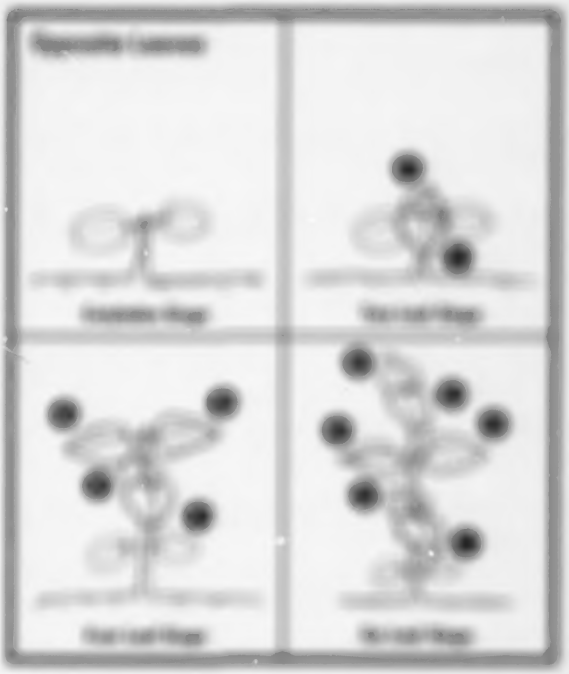
National toll free number: 1-800-267-6315 – Pest Management Information Service
Visit the website: http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php
On line versions of the current labels are available via the following link:
http://www.hc-sc.gc.ca/cps-spc/pest/registrant-titulaire/tools-outils/label-etiq-eng.php

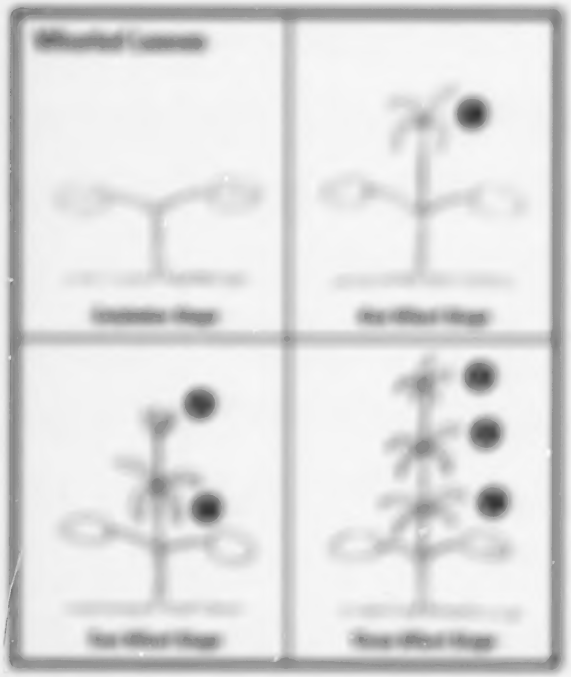
Leaf Stages – Cereals and Grasses

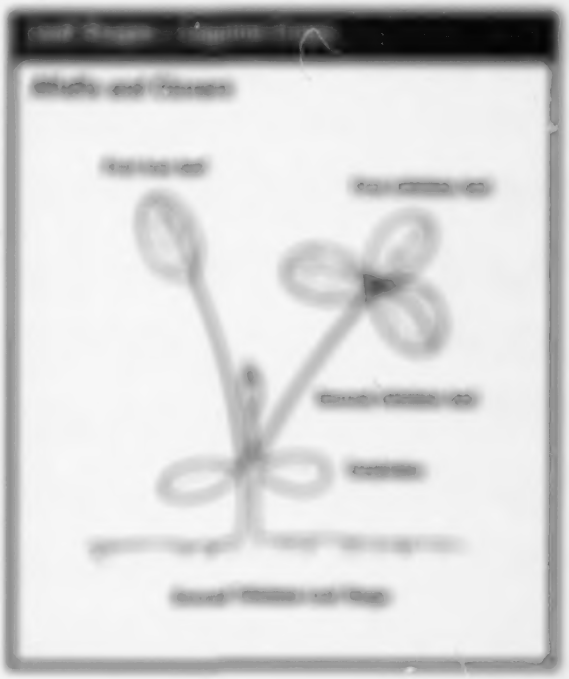


Leaf Stages – Broadleaf Weeds

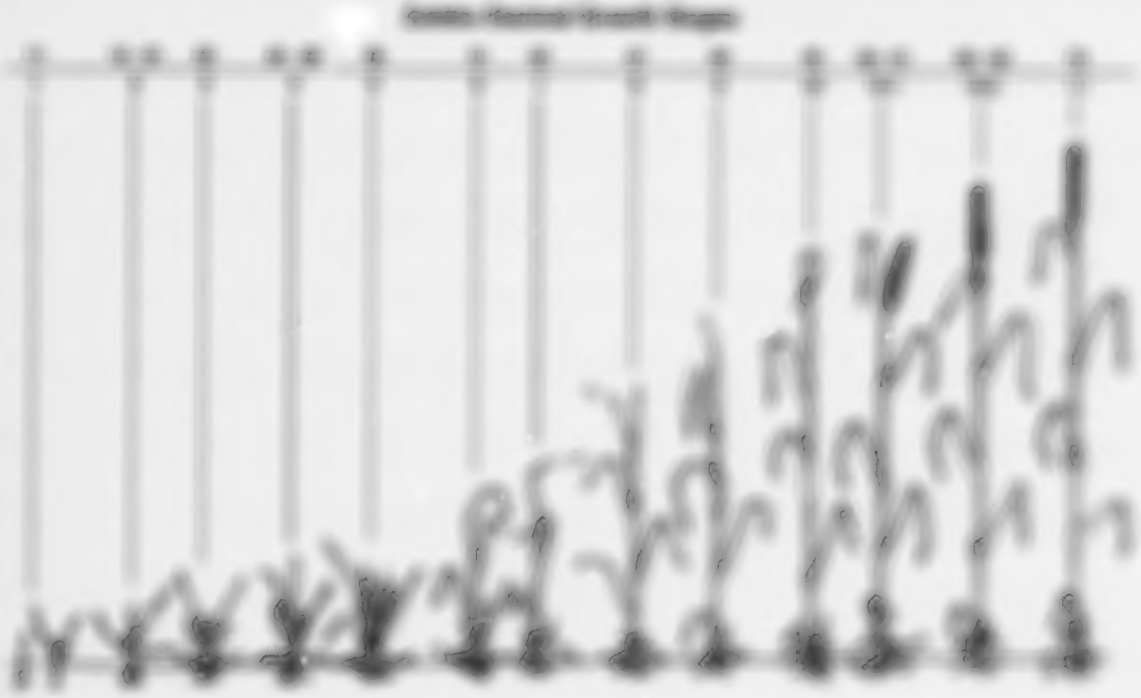


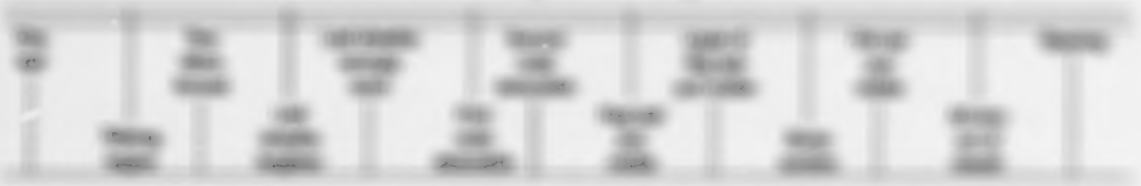




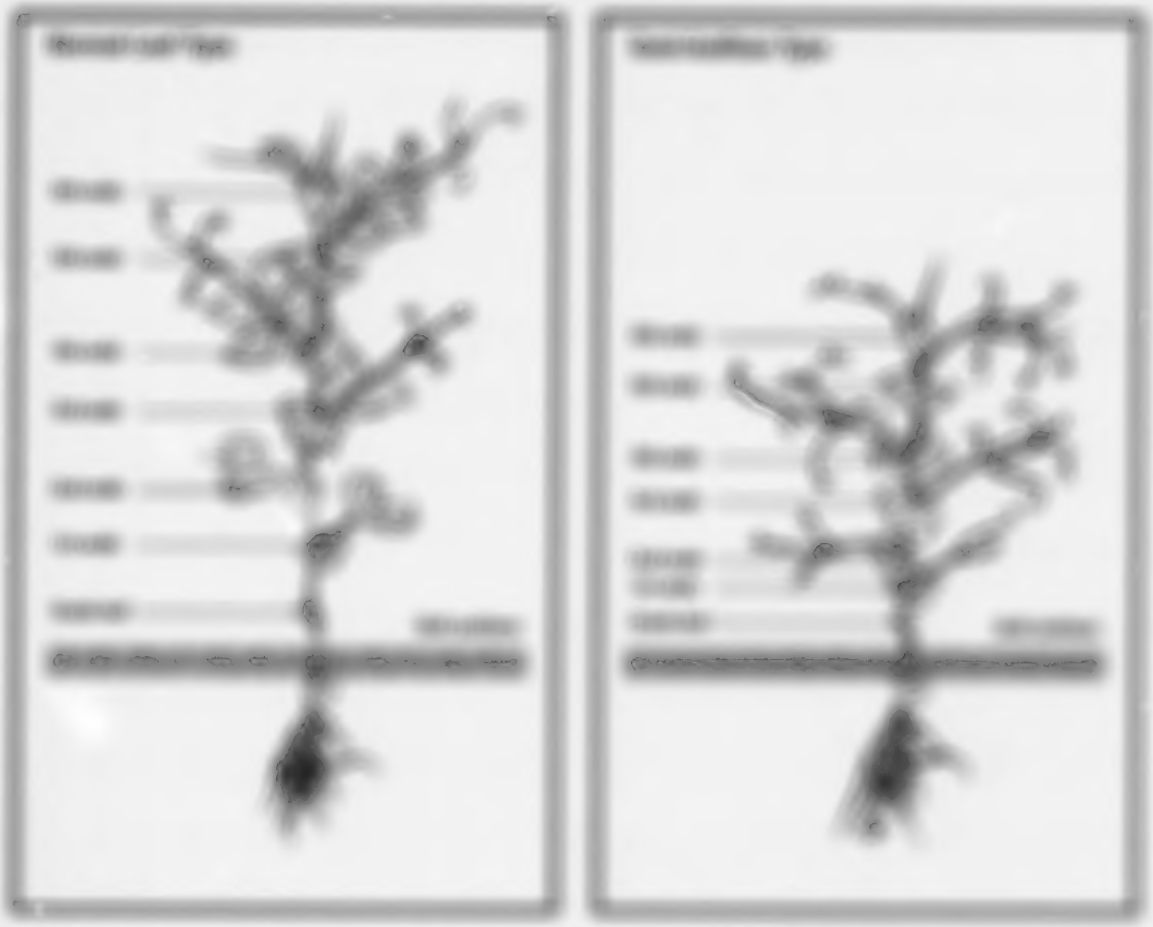


Cereal Growth Stages



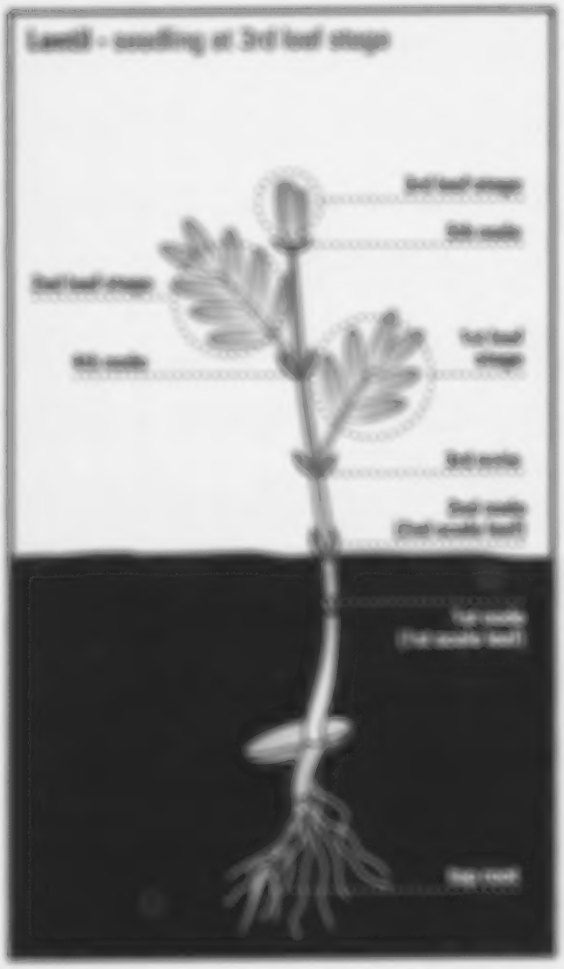


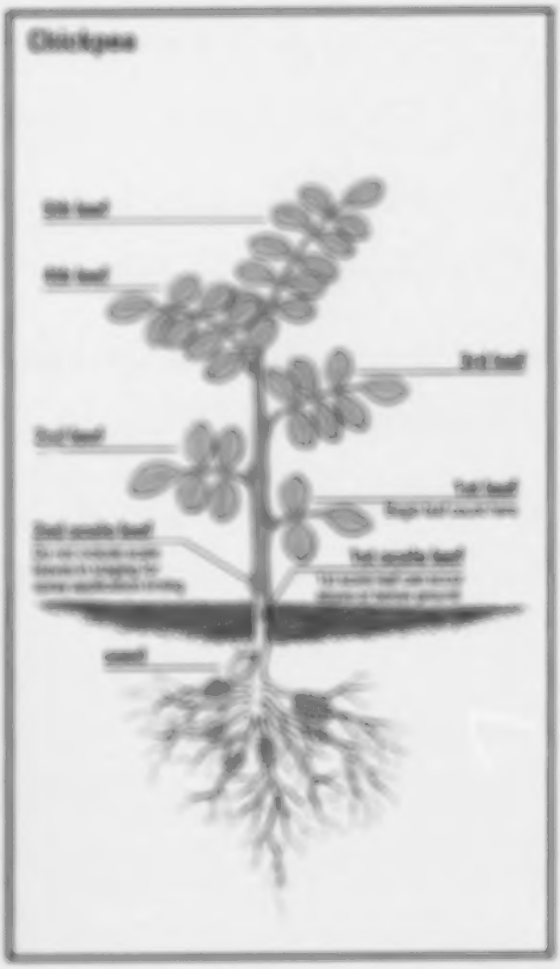
Pea Node Leaf Stages



Bean Leaf Stages

Lentil and Chickpea Leaf Stages





Lentil drawing courtesy of Herbert Nemec Pulse Growers.

Source: BASF Canada
Acknowledgement: Technical expertise from Dr. G Hosfield.

How to Use This Book

This publication assists in the selection and application of pesticides. The pesticides are grouped into four main sections:

- herbicides
- insecticides
- seed treatments
- foliar fungicides.

Each section is indexed separately and has helpful selector charts after the registration information.

Use the pesticide selector charts and the detailed pesticide descriptions to choose the most appropriate chemicals. To select a suitable pesticide, follow these steps:

- Identify the pest(s).
- Refer to the chart for weed or insect pests, and record the pesticide(s) available.
- Refer to the appropriate pesticide(s) in the text, and select the product best suited to your operation.
- Apply the pesticide strictly according to instructions given on the label attached to the product container.

Chemical Pest Control Summary

Know your problem(s).

- Identify the pest(s).
- Estimate infestation level or probable economic loss to determine if treatment is required.
- Know the crop variety. Some products are restricted to, or excluded from, use on specific crop types or varieties.
- If necessary, note soil type or texture of the area to be treated.

If chemical control is necessary, choose a pesticide based on the following criteria:

- Registered products for the given crop (tank mixes may have separate recommendations).
- Pests controlled by the product.
- Crop and pest stage of growth or development.
- Recommended application time (e.g. spring, summer, fall; time of day).
- Cropping and/or harvest restrictions of product(s) considered.
- Use the least toxic, suitable product.

Read product label directions for:

- Recommended rate(s) for the particular pest, infestation level, crop and field conditions.
- Method of application.
- Any application restrictions during adverse or extreme weather conditions.
- Any other restrictions, cautions or special instructions.

Clean, prepare, maintain application equipment.

- Lubricate and repair equipment to get the best possible performance.
- Clean spray tank of residues to prevent crop damage or problems with equipment.
- Clean, calibrate and, if necessary, replace spray nozzles.
- Check pump and pressure system.

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Safely prepare pesticides for application.

- Use protective clothing and recommended safety equipment; the exposure hazard is greatest during mixing.
- Follow the mixing instructions.
- Use the specified amount and quality of water.
- Use recommended rates (tank mix rates may be different from each pesticide used alone).
- If specified, add adjuvants.
- Record the following: rates used, mix order, pesticides and adjuvants used as well as water quality for future reference.

Apply pesticides using:

- Recommended safety precautions and equipment.
- Proper application equipment.
- Recommended rates of pesticides, adjuvants and water.
- Proper time (e.g. growth stage, time of day, season).
- Recommended techniques (e.g. ground speed, pressure, incorporation).
- Record weather conditions at time of application, techniques used, growth stage of crop and pests for future reference.

Sprayer Operations

A summary of sprayer operations is presented in this publication.

Getting the sprayer ready:

- Preliminary maintenance, adjustments and settings must be made according to the operator's manual.
- The entire sprayer system should be cleaned and rinsed.
- Ensure that all nozzles are the same size and spray angle by checking the code number on the nozzle tip.
- Partially fill sprayer tank with clean water.
- Check the pump for adequate output. If the desired spraying pressure can be achieved with the agitator and boom valves open, the pump output is okay.
- Check accuracy of main sprayer gauge by installing a new gauge on the boom end temporarily and compare the pressure readings. The readings should be identical.
- Inspect spray patterns and replace tips that have streaky patterns. Flat fan nozzles should be aligned, so the patterns do not interfere with each other.

Sample Nozzle Chart

Nozzle number	Pressure kPa	Litres per minute	Litres per acre (50 cm spacing) 6 km/h	8 km/h	9 km/h	10 km/h
11001	275	0.38	30	22	20	18
110015	275	0.57	45	34	30	27
11002*	275	0.75	60	45	40	36

* Standard tips for 40 L/acre at 275 kPa and 9 km/h. For nozzles not included, refer to manufacturer's data.

Note: If spray charts are not available for your nozzles, the following formula may be used to establish the ground speed required to apply the desired litres per acre.

Formula:

Average nozzle output (L/min) x 240 = km/h
Litres per acre x nozzle spacing (m)*

* Standard nozzle spacing is 0.5 m.

Example:

0.75 L/min x 240 = 180 = 9 km/h
40 L/acre x 0.5 m 20

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Nozzle tip calibration

The output of individual nozzles must be within 5 per cent of the average nozzle output to provide an even volume over the width of the spray swath. Nozzles with outputs either above or below this value must be replaced.

- With the spayer operating at the recommended spraying pressure (275 kPa), collect, measure and record the output from each nozzle on the boom for one minute. Note: if nozzle strainers are equipped with ball-check valves, increase pressure by 35 kPa.
- Calculate the average output.
- Replace nozzles with output 5 per cent greater than average. Clean and recheck nozzles with output 5 per cent less than average.

Ground speed determination

Actual ground speed can be confirmed by noting the time it takes to travel a measured distance. The following ground speed chart is based on the time required to travel 800 metres.

Speed (km/h)	Travel time for 800 m (min:sec)
7	6:48
8	6:00
9	5:20
10	4:48
11	4:22
12	4:00

Sprayer Calibration – Example L/acre

Step 1: Determine the number of acres to spray using your field records.

Example: 30 acres

Step 2: Know the sprayer tank capacity, which is marked on sprayer tank.

Example: 2,000 litres

Step 3: Determine spray volume needed per acre, which can be obtained from the pesticide label or this publication.

Example: 40 litres per acre recommended

Step 4: Select nozzles for 40 litres per acre from the manufacturer's chart or the sample nozzle chart in this publication.

Example: Nozzle No. 11002 at 275 kPa and 9 km/h = 40 L/acre

Step 5: Check nozzle output. See nozzle tip calibration.

Example: Nozzle flow between 0.71 to 0.79 litres per minute per nozzle is okay

Step 6: Calculate total spray solution needed by multiplying number of acres x litres per acre.

Example: 30 acres x 40 litres per acre = 1,200 litres

Step 7: Calculate the total amount of pesticide needed from the pesticide label or this publication (multiply litres of pesticide per acre x number of acres to spray).

Example: 0.60 L/acre x 30 acres = 18 L of pesticide and 1,182 L of water in sprayer tank

Step 8: Set sprayer to travel at desired speed. See Step 4 (example) and nozzle chart.

Example: Required speed = 9 km/h (36 seconds to travel

Standard Benchmarks

Application volume: 40 litres per acre (L/acre) = 100 litres per hectare (L/ha) = 8.8 Imperial gallons per acre

Spraying pressure: 275 kilopascals (kPa) = 40 pounds per square inch (psi)

Speed for spraying: 9 kilometres per hour (km/h) = 5.4 miles per hour (mph)

Nozzle spacing on spray boom: 0.5 m = 20 inches (in.)

Height above target for 80° and 110°
Nozzle tips: 45 centimetres (cm) = 18 inches (in.)
Nozzle tips: 8002 or 11002

Note: A standard nozzle puts out 0.75 litres per minute at 275 kPa. At 9 km/h, these nozzles apply 40 L/acre of spray.

Metric equivalents

1 acre = 0.405 hectare
2.471 acre = 1 hectare
6.9 kPa = 1 psi
1.6 km/h = 1 mph
2.54 cm = 1 in
1 litre/acre = 2.5 litre/ha

Calibrating Small Sprayers

The spray volume that a backpack or hand-held sprayer will apply per acre can be determined by field testing the sprayer on a portion of an acre. The size of the test area commonly used is 1/100 of an acre. It is important that the test area surface is similar to the surface to be sprayed, so the walking speed will remain the same.

Step 1: Establish a test run distance to spray 1/100 acre (40.5 m_2) according to the swath width of the sprayer.

Swath width	Test run length
0.5 metres	81.0 metres
1.0 metres	40.5 metres
1.5 metres	27.0 metres
2.0 metres	20.2 metres

Step 2: At a comfortable walking speed, spray the test area and measure the volume of water used (repeat 2 or 3 times to obtain an average). This is the amount applied to 1/100 acre.

Example: 2 litres

Step 3: Multiply the figure arrived at in Step 2 by 100 to get the spray volume per acre.

Example: 2 L x 100 = 200 L/acre

Step 4: Determine the amount of pesticide to add per tank load. Divide the volume applied per acre by tank capacity to determine the number of fills required to spray an acre.

Example: 200 L/acre ÷ 20 L/tank = 10 fills

Divide the chemical rate per acre by the number of tank loads required to spray an acre to determine the amount of product to add per tank load.

Example: 1 L/acre ÷ 10 fills = 0.1 L/tank

Preparation and Application of Pesticides

Tank Mixtures

Tank mixtures are two or more separate pesticides mixed in the sprayer tank, as opposed to a mixture formulated by the manufacturer. Tank mixing is often done to reduce the number of applications of pesticide. Mixing a grassy herbicide with a broadleaf herbicide is one of the most common mixtures. Another reason for mixing herbicides is to include more than one mode of action on the weeds to combat the development of resistance in the target pest. Lately, there have been a lot of pesticide products put together as co-packs. That is when the tank mix partners are placed in individual containers in the same box.

Adjuvants (surfactants, wetting agents, spreaders, etc.)

Adjuvants are added to a pesticide to enhance application and/or performance. The most common adjuvants used in pesticides are surfactants. If adjuvants are required, use only those products named and recommended on the label. Failure to do so could result in the following:

- crop injury
- reduced pest control
- invalidation of pesticide warranty

Surfactants facilitate and enhance the emulsifying, dispersing, wetting, spreading, sticking, penetrating or other surface-modifying properties of liquids to bring about enhanced pesticidal action. Because these chemicals produce physical changes at the surface of liquids, surfactants are often referred to as surface-active agents.

Surfactants are generally classified into two major groups based on how they react in water: ionic or non-ionic. Ionic surfactants break down into two entities when mixed in water, – a positively charged ion (cation) and negatively charged ion (anion). An example is ammonium sulphate ($2\ NH_4^+ + SO_4^-$). Note: Ammonium sulfate is not a true surfactant.

Non-ionic surfactants do not break down in water. Consequently, they are unaffected by hard water, can be used in strong acid solutions and are more soluble in cold water than in hot water. Some of the commonly recommended non-ionic surfactants for herbicide mixtures are Agral 90, LI 700, Ag-Surf, Companion, Citowett Plus, Enhance, Super Spreader, Tween 20.

Preparing a tank mix

To avoid physical incompatibilities, go through the following general steps or use the appropriate mixing instructions below:

- add half the required amount of water and mix with one pesticide
- agitate
- with agitator running, add the other pesticide. Add pesticides to the spray tank in the following order to reduce the possibility of formation of precipitates or gums that may clog nozzles and filters:
  - soluble powders
  - wettable powders and flowable liquids
  - solutions (amines and salts)
  - emulsifiable concentrates (esters)
  - additives (surfactants)

Specific Mixing Instructions

"a" Single product mixing instructions

1. Fill clean tank to ½ full with clean water.
2. Turn on full agitation.
3. Add the proper amount of herbicide to the water in the spray tank with the agitator running. Maintain full agitation until completely dissolved and product is fully dispersed. Continuous agitation is required to keep the product in suspension.
4. After herbicide has been well mixed and is in suspension, add tank mix partners and then a recommended non-ionic surfactant, **if required**.
5. Add the remainder of the water.

On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

"b"

1. Fill tank ½ full of water.
2. Start sprayer agitation.
3. Add Group 2 herbicide and agitate vigorously, if a granule, agitate until dissolved.
4. Add tank mix partner herbicide and continue to agitate.
5. Add adjuvant (if required) and continue to agitate.
6. Add antifoaming agent if required and continue agitation.
7. Complete filling of the tank with the balance of the water.
8. If tank mix partner is an E.C. (emulsifiable concentrate), do not over agitate, to avoid inducing an invert emulsion.

"c"

1. Clean spray tank and ½ fill with clean water. Start agitation or bypass system.
2. Add broadleaf herbicide to the tank first prior to adding grassy herbicide and agitate for 2 - 3 minutes.
3. Add correct amount of grassy herbicide.
4. Agitate for 2 - 3 minutes.
5. Add correct amount of adjuvant (if required).
6. Agitate for 1 - 2 minutes before adding remainder of water.
7. After any break in spraying operations, agitate thoroughly before spraying again.
8. Use the spray suspension as soon as it is prepared.
9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

"d"

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank ½ to ¼'s full with clean water and start agitation or bypass system.
3. Add grassy herbicide first. Vigorously agitate until dissolved.
4. Add broadleaf herbicide product second followed by any registered tank mix partner (if desired).
5. Add adjuvant/surfactant(if required) and complete filling the spray tank.

"e"

1. Always start with a clean and empty sprayer tank.
2. Fill the tank 1/3 to 1/2 full of clean water.
3. With the agitator running, add the required amount of Express herbicide.
4. When Express herbicide has been thoroughly dissolved, add the required amount of the appropriate tank mix partner.
5. If the tank mix partner is an emulsifiable concentrate (EC), reduce agitation to avoid inducing an invert emulsion. Once dissolved, Express will remain in solution.
6. Add the rest of the water.
7. If required for tank mixture, add surfactant.
8. Refer to the label for specific tank mixing order and directions.
9. For repeat tank loads, reduce the material remaining in the tank to 10% of the original volume or less before proceeding with Step 1 because remaining chemicals may prevent Express from completely dissolving. If it is not possible, pre-slurry Express herbicide in a small amount (5 - 10 L) of water before adding to the tank.
10. If an anti-foaming agent is required, add last.

Avoid tank mix problems

Check the labels for recommended crops, pests and rates for tank mixes as they may be restricted compared to the recommendations for each individual product. For example, either Poast or MCPA Amine alone can be used on several crops. A Poast + MCPA Amine tank mix can only be used on flax.

Crop injury, reduced pest control or physical incompatabilities may be the result of using tank mixes improperly. When herbicides for grassy weed control are mixed with herbicides for broadleaf weed control, a partial loss (sometimes total loss) of activity on grassy weed control is quite common. When reduced weed control or crop injury is likely to occur, the advantages of tank mixing are quickly lost.

- Tank mix properties are not necessarily the same as those of the individual pesticides applied separately.
- Use registered tank mixes only.
- Check the labels for recommended crops, pests, rates and adjuvants for tank mixing.
- Follow label directions for preparing the mix.
- Use only on crops or varieties registered for the particular tank mix.
- Apply at the recommended stage of growth or development of crop and pest(s).

Sprayer Clean-out

Modern pesticides can affect susceptible crops at very low concentrations. Proper sprayer cleaning is a critical component for the maintenance of the sprayer, reducing water contamination risks and eliminating crop injury from equipment contamination.

Herbicide residue adheres to tank walls and crevices and may be brought into solution by a subsequent herbicide or a particularly effective spray adjuvant acting as a solvent. Plastic or polyethylene tanks and hoses tend to require more extensive cleaning than stainless steel tanks. Post-emergent application sprayed directly on crop foliage will have a greater potential for crop injury than soil-applied herbicide. Crop injury from sprayer contamination can occur even several months after using the sprayer without proper cleanup, and injury can occur even following several subsequent applications.

Water is needed for dilution. The more often a sprayer is rinsed out, the greater the dilution of chemical left. You have a greater dilution by repeatedly rinsing the tank with small quantities of water rather than one rinse with a large volume of water. Water is adequate to flush and rinse the sprayer with some herbicides, but others need additional cleaning agents. The additional cleaning agents needed for cleaning will depend on the herbicides used. There are common household chemicals that can be used, but most producers use commercial sprayer cleaning products. Sprayer cleaning agents can have several functions including dilution, solubilization and/or de-activation.

Cleaning agents can increase the solubility of a herbicide. Ammonium increases the pH of the solution, which increases the solubility of sulfonylurea herbicides. The agent may not help break down the herbicide, but it does help strip the herbicide off the tank surfaces and get it into solution. Chlorine bleach enhances the decomposition of sulfonylurea and many other herbicides, but it is **less** effective than ammonia at dissolving and removing sulfonylurea from the tank.

Chlorine bleach should never be added to ammonium or liquid fertilizer containing ammonium as, when mixed together, the two materials react to form toxic chlorine gas, causing eye, nose, throat and lung irritation.

Oil-based solvents such as fuel oil are most effective for removing oil-soluble herbicides, such as esters and emulsifiable concentrates. The oil solvent should be followed with a detergent rinse to remove the oil residue.

Detergents remove many materials including water and oil-soluble herbicides. Commercially available sprayer cleaning agents normally perform better than household detergents for cleaning sprayers.

The best source of information on cleaning agents and procedures is the herbicide label for the product used.

Activated charcoal de-activates organic herbicides.

A 3 per cent suspension of activated charcoal in water can be added and circulated throughout the sprayer system to tie up and de-activate any pesticide residue. The charcoal must be removed by rinsing to prevent the de-activation of a portion of the pesticide used in the sprayer.

Sprayers should be cleaned as soon as possible after use. Dried pesticide residues are much more difficult to remove than pesticide in solution. Reduce waste and excess application by only mixing the amount of pesticide required, and apply the entire amount on the field according to the label recommendations. Thoroughly rinse the sprayer tank with water, circulate the water through the sprayer system and, if possible, apply the rinsate to the treated field.

Do not clean sprayers near creeks, dugouts, sloughs, wells or any other water sources. Ensure that wash water does not come into contact with any desirable vegetation or its roots. Make sure discharged wash water (especially from insecticides) will not be accessible to children or animals. Do not contaminate any watercourse or water body with wash water.
Note: Pesticides may have specific recommendations for sprayer clean-out. Refer to product labels on the container for recommendations.

There are three main methods for sprayer tank clean-out depending on the pesticide used.

Method A

Drain contents of tank followed by 1 or 2 water rinses, 2 ammonia rinses (**NOT containing chlorine**) followed by 2 water rinses (use just prior to next sprayer event). Products that can use this cleanup method include 2,4-D, Accord, Ally, Amidine, Amidex, dicamba, dichlorprop + 2,4-D, DyVel, Eurosl, Everoxl, Express, FlaxMax, Harmony Total, MCPA, Mustang, Mustang Gold, Nuance, Peyload, Pixel Ultra, Prism, Pursuit Ultra, Refine, Refine M, Rustler, Sundance, Tordon 22K.

Method B

Drain contents of tank followed by 2 water rinses, 2 detergent rinses, then 2 more water rinses. Products you use this method for include Aztec, Liquid Achieve SC*, Achieve Liquid Gold*, Basagran, Brominoxynil + MCPA, clethodim, Granaxone*, Liberty, Poast*, Super, Reglone Desiccant*, Reward*, Scepter, trifluralin products, Venture L*.

*Manufacturers of these products recommend adding a non-ionic surfactant such as All Clear, Agral 90 or Agsurf at 0.6 L per 100 L water.

Method C

Drain contents of tank followed by several repetitions of the water rinse with nozzles and screens removed and checked for debris. Products that can use this method are Assure II, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Lontrel, Odyssey, Prestige, Solo.

The above directions are general processes based on similarities of tank cleaning recommendations between products in each of the herbicide groups. Always follow the specific instructions on the product label. Follow these guidelines if label recommendations don't cover tank cleanup.

Products that are water based can usually be cleaned from the spray tank using Method C. Products formulated as an EC (emulsifiable concentrate), SC (soluble concentrate), or F (flowable) or use a petroleum-based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the sides of the tank. Most Group 2 herbicides have tank clean-out recommendations, but those that do not should use Method A for tank clean-out. If there is a tank mix of different pesticides, use the appropriate combination of methods to clean the tank.

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Group 2 herbicides will occasionally get trapped on the tank wall by petroleum-based formulations or adjuvants, resulting in tank residues. Add detergent at 0.25 L/100 L to the ammonia rinse to prevent this situation from happening. The detergent breaks down the petroleum coating to allow the ammonia access to the Group 2 product.

What to Do if Results Are Unsatisfactory

- Ensure the choice of pesticide(s) was suitable. Are the treated crops and pests listed on the product label(s)?
- Compare your method of pesticide preparation to the product label(s) instructions.
- Check for equipment malfunction – e.g. plugged screens, nozzles worn or mixed type or size.
- Compare your application techniques with those given on label(s) – e.g. stage of growth or development of crop and pest(s), ground speed, pressure and incorporation.
- Consider weather conditions at application time – several labels include cautions against application during weather extremes – e.g. cold, heat, drought.
- Consider time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect.
- If results are unsatisfactory, seek technical help. Gather all relevant data, particularly evidence such as photos or specimens. Record wind, rainfall, soil moisture condition, crop variety, fertility, quantity of material used, areas treated and temperature at time of spraying.
- Document everything in writing. If crop damage is involved, submit a specimen for diagnosis. Disease or insect damage can resemble herbicide injury.

Pesticides and the Environment

Responding to a Pesticide Related Concern

The *Environmental Protection and Enhancement Act* prohibits any person from causing adverse effects when using pesticides. Farmers who witness or suspect a pesticide drift or runoff that could affect their family, pets or livestock or cause an adverse effect to their shelterbelt, crop or their land should take the following actions to protect themselves and assist in an investigation that may result at a later date:

- Immediately respirator family members to go into the house to protect themselves from exposure. Close all windows and air conditioning units in the house. If they have felt spray settle on them, they should immediately remove clothing and wash exposed skin. If any physical symptoms develop, then they should seek medical assistance or call the Poison Centre at 1-800-332-1414.
- Pets should be removed from the immediate spray area or area where drift has occurred.
- If livestock are at risk, the applicator should be asked to stop the application until the livestock can be removed or conditions change so the wind is blowing away from the livestock.
- If drift has occurred in the farmyard, then outdoor furniture and play equipment should be washed before use and garden produce, berry and fruit trees should not be harvested or consumed but should be monitored for unusual growth or discoloration. If the produce shows signs of damage, it should be destroyed. If berries or fruit trees show signs of damage, the berries or fruit should not be eaten. If no signs of damage occur after one to two weeks (depending on the pesticide), then all produce, berries and fruit should be washed thoroughly.
- Record as much detail of the application equipment (colour and type of spray equipment, make, model, license plate number, company information off water trucks, colour, distinguishing features, roll numbers on the aircraft). If possible, take pictures.
- Write down everything regarding what was witnessed including date and time of occurrence, weather

conditions at the time, crop being sprayed, pesticide being applied (how pesticide container or the site), nature of drift witnessed, description of person(s) helping or doing the application, other witnesses.

- Attempt to contact the adjacent landowner and indicate your concerns.
- Contact the Alberta Environmental Response Centre at 1-800-222-6514 promptly for information and assistance in investigating the concerns. Some pesticides degrade quickly so prompt investigative action is required to proceed with enforcement action.

Pesticide Residues Found in Alberta Water Sources

A long-term study of water sheds in the province recently concluded. The Alberta Environmentally Sustainable Agriculture (AESA) Stream Survey was initiated in 1999 and continued until 2006. It tested the water quality in 22 watersheds throughout the agricultural areas of the province several times each year to get information on the presence and distribution of 68 possible pesticide residues in the waters. Four of 22 watersheds received irrigation return flows and the rest were dryland.

Results show pesticide residues were commonly found in the water samples. Keep in mind that testing processes are able to detect very small amounts of chemical, far below any observable effect. Maximum pesticide concentrations were typically found in spring and during summer pesticide applications. Concentrations of detected pesticides occasionally exceeded existing water quality guidelines for either the protection of aquatic life or irrigation use.

This study highlights the importance of using due care and attention when applying pesticides as they do not necessarily remain where they are applied. Use integrated pest management strategies to improve the impact of applied pesticides and established benchmarks for the use of registered pesticides. The Farmer Pesticide Certificate program is an excellent example of training for the when, where and how to use pesticides.

For more information on the results or for a full version of the study, check Alberta Agriculture's website at http://www5.agric.gov.ab.ca/$department/deptdocs.nsf/all/sri10964

Pesticide Applicator Certificate

Anyone applying pesticides (herbicides, insecticides, fungicides or rodenticides) on property not owned, rented or leased by them, or in exchange for a fee must hold a Pesticide Applicator Certificate (issued by Lakeland College) and a Pesticide Service Registration (issued by Alberta Environment). If someone is offering to spray your property, ask to see a Pesticide Service Registration and a Pesticide Applicator Certificate. All applicators are issued wallet-sized identification cards.

For questions pertaining to pesticide applicator certification, please call Lakeland College at 1-866-853-8686. For questions pertaining to service registrations, contact the nearest regional office of Alberta Environment.

Please remember that a certificate is not a guarantee of performance. A certificate only certifies that the certificate holder has met a minimum standard of knowledge. It cannot assess an applicator's integrity or the honesty of his business practices. If you are uncertain about the reliability of a pesticide applicator, ask for references.

Farmer Certification Requirements

Pesticide manufacturers and the federal Pest Management Regulatory Agency (PMRA), in consultation with provincial agriculture and environment departments across Canada, have agreed that some pesticides have higher toxicity and/or greater potential to adversely affect health or the environment and require producers to obtain further knowledge to purchase and use them. This means producers must take a course and pass an exam verifying that they have the knowledge to safely and effectively manage and apply these pesticides when applying them on their own property. Currently, pesticides containing the active ingredient aluminum phosphide require mandatory certification for producers to purchase and use. Aluminum phosphide is used to treat stored grain pests and for rodent control in the field.

Producers are encouraged to consider obtaining Farmer Pesticide Certification. The course contains detailed grain fumigation and rodent management information that can assist in preventing outbreaks and managing them more effectively when they occur. The Environmental Farm Plan further encourages producers to learn more information about safe and effective

handling, use, application, storage, transportation and disposal of pesticides. The Human Pesticide Certificate course has been developed for producers and covers the Standard for Pesticide Education, Training and Certification in Canada. This web does it provide producers with essential information. It also provides evidence to the public, who consume food produced, that producers hold current knowledge required to safely and effectively apply pesticides.

Producers can obtain the Human Pesticide Certificate course materials from the following sources:

- [illegible] at: http://www.[illegible].gov.
  ab.ca/$department/deptdocs.nsf/all/pest10305

The Agri-Trade Course can also provide producers with information regarding the best practices that can be taken throughout Alberta and how and where producers can write the certificate examinations.

Note: The Human Pesticide Certificate does not qualify a producer to apply pesticides for other farmers or for a fee. Producers wishing to provide pest pesticide application service off their own property must obtain a Pesticide Applicator Certificate. The training material and examinations for this certificate is offered through individual colleges at [illegible].

Pesticide User Responsibility

Pesticide drift

Pesticide drift is a concern for general as well as aerial applicators. Landowners are responsible for ensuring that any pesticide applications conducted on their property are conducted in a safe, responsible manner.

- The desire of livestock should be made with reference land use in mind. If neighbours have livestock, bees, [illegible] and gardens that may be affected by off-target drift, they should be notified prior to application. Perhaps a difference decision, consideration or application method will provide the same control and greater compatibility with neighbouring land uses.
- All sprayers sprayed or will should be calibrated prior to use, taking into consideration nozzle type, nozzle pressure and boom height. Calibration will assure better performance as well as reducing the risk of livestock drift. The use of spray shrouds or shielded protection on the sprayer can also assist in to minimize spray drift. If you are hiring a custom applicator, ensure he or she is up to date on the equipment and their calibration and be sure to check testing for applicators to use whenever any mobile work is occurring.
- Boom sprayers or shielded can help reduce spray drift.
- Buffer strips should be left when applying pesticides near a sensitive areas, [illegible] and farmsteads. The size of these strips may be specified on the pesticide label. Call if you have the site with disposal to the [illegible] party. All applications reported and the degree of the three surveying drift. Granular applications [illegible] area know, sands, silts, irrigations sands or other open facilities of water supply areas and sand [illegible] to cause water users will not be affected by the proposed pesticide applications and that the applications is undertaken in a manner that will not adversely affect aquatic or riparian habitats. Finally, several organizations should be [illegible] surveys users facility to cause water quality and to provide a general traffic and flow the applications handbook. A Special Use Approval must be obtained [illegible] effective Environment to perform pesticide applications within 30 metres of the open body of water when the adjacent land is unimproved rangeland, pasture or forage. Certified applicators applying pesticides within 30 metres of the open body of water do not require a Special Use Approval as long as the pesticide they are using is identified in the Environmental Code of Practice for pesticides and they are following the conditions of application specified in the code.
- Pesticides should not be sprayed when winds are excessive, generally [illegible] km/h, as they may be considered to drift hazards. Pesticides should only be sprayed when winds are blowing away from farmsteads, residence, crops or water bodies. Conditions of "fresh wind" or temperature inversions or gusting should also be avoided to prevent injured drifts. A volatile drift reduction additive or will save both time, [illegible] the potential drift hazard associated with the spraying of pesticides.
- Appropriate records that practice a good [illegible] and range and maintain the productivity of the [illegible] are an importance with management and.
- Always assess the risk in adjacent landowners and land, pest weather conditions in each [illegible]. If completing an applications in a pesticide use zone, [illegible] and neighbours property, postpone the applications or modify to a practice off-target damage. Landowners can be held liable for pesticide

[illegible] [illegible] [illegible] [

[illegible] [illegible] [illegible] [

[illegible] The provision of this course includes [illegible] [illegible] [illegible]

Pesticide Container Site Locations

Municipality	Site	Legal land location	Contact
Acadia, MD of	Acadia Valley Landfill	NW-7-25-11-W4	403-972-3908
Athabasca, County of	Colinton Waste Transfer Station	NE-7-69-22-W4	780-675-2273
Barrhead, County of	Barrhead Landfill	SW-5-63-4-W5	780-674-2331
Beaver County	Ryley Regional Landfill	NE-13-50-17-W4	780-663-3730
Beaver County	Viking Waste Transfer Station	NE-31-47-12-W4	780-663-3730
Big Lakes, MD of	High Prairie Regional Landfill	NW-9-73-15-W5	780-523-5500
Birch Hills County	Marshall Landfill	SW-13-78-3-W6	780-639-3700
Birch Hills County	Spirit Landfill	NE-36-78-25-W5	780-639-3700
Bonnyville, MD of	Bonnyville Sand Cleaning Plant	NW-19-61-5-W4	780-826-3951
Bonnyville, MD of	Goodridge Landfill	SW-4-63-5-W4	780-826-3951
Brazeau County	Drayton Valley - Brazeau Reg. Landfill	SE-33-49-7-W5	780-542-7777
Calgary, City of	Calgary - Forest Lawn Landfill (excludes MD 4144)	3501-68 St. S.E. Calgary	403-896-8619
Camrose, County of	Camrose Regional Landfill	NE-19-46-20-W4	780-672-4705
Camrose, County of	Hardisty - West Street/West Lake Landfill Authority	SW-19-44-21-W4	780-672-4705
Cardston County	Spring Coulee Waste Transfer Station	SW-32-4-25-W4	403-653-4977
Clear Hills, MD of	Worsley Landfill	SE-25-87-9-W6	780-685-3925
Clearwater County	Rocky Mountain House Waste Transfer Station	SE-2-39-8-W5	403-845-4444
Cypress County	Acme Waste Transfer Station	NE-31-11-2-W4	403-526-2088
Cypress County	Medicine Hat - Lakeside Milling	NE-21-12-6-W4	403-526-2088
Cypress County	Schuler Waste Transfer Station	SE-33-15-1-W4	403-526-2088
Drumheller, Town of	Drumheller Regional Landfill	2450 South Railway Ave	403-822-1349
Edmonton, City of	Edmonton - Clover Bar Landfill	SW-29-53-23-W4	780-496-5411
Fairview, MD of	Fairview Landfill	SW-21-82-3-W6	780-835-2575
Flagstaff County	Sedgewick - Flagstaff Reg. Landfill	SW-11-45-12-W4	780-384-3353
Foothills, MD of	Okotoks - Foothills Reg. Landfill	SE-32-19-29-W4	403-652-2361
Forty Mile, County of	Bow Island Landfill	SE-23-11-11-W4	403-867-3533
Forty Mile, County of	Foremost Waste Transfer Station	NW-19-9-11-W4	403-867-3533
Grande Prairie, County of	Clairmont Landfill	NW-21-72-6-W6	780-513-3500
Grande Prairie, County of	West County Regional Landfill	51-5-22-70-6-W6	780-513-3500
Greenview, MD of	Valleyview - MD Yard	NW-13-70-22-W5	780-524-7622
Greenview MD	New Fish Creek Transfer Station	NW-19-72-21-W5	780-524-7622
Greenview MD	Kakwa Landfill	SW-35-76-05-W6	780-524-7622
Greenview MD	Sweathouse Landfill	SW-4-70-15-W5	780-524-7622
Greenview MD	Ballott Transfer Station	Ballott Transfer Station	780-524-7622
Kneehill County	Three Hills Waste Transfer Station	SW-25-31-24-W4	403-443-5540
Lac La Biche County	Lac La Biche Landfill	NW-36-69-13-W4	780-623-4468
Lac Ste. Anne County	Sunset - Lac Ste. Anne Reg. Landfill	NE-19-55-3-W5	780-785-3411
Lac Ste Anne County	Weyerhaeuser Transfer Station	SE-23-57-08-W5	780-785-3411

Municipality	Site	Legal land location	Contact
Lacombe County	Eckville Waste Transfer Station	NW/26-29-3 W5	403-782-6601
Lacombe County	Mirror Alix Waste Transfer Station	NW/24-40-23 W4	403-782-6601
Lacombe County	Prentiss Waste Transfer Station	NW/1-40-25 W4	403-782-6601
Lamont County	Lamont Regional Landfill	NW/7-56-18 W4	780-895-2585
Leduc County	Nisku Sewage Transfer Station	SW/31-50-24 W4	780-955-2555
Leduc County	Thorsby – County Yard	SE11-49-1 W5	780-955-2555
Lesser Slave River, MD of	Flatbush Waste Transfer Station	NW/36-68-2 W5	780-681-3929
Lethbridge, County of	Coalhills Waste Transfer Station	SW/23-9-20 W4	403-329-1525
Lethbridge, County of	Iron Springs Waste Transfer Station	SW/27-11-20 W4	403-329-1525
Lethbridge, County of	Coalhurst Waste Transfer Station	SE10-11-23 W4	403-329-1525
Lethbridge, County of	Picture Butte Waste Transfer Station	NW/27-10-21 W4	403-329-1525
Mackenzie, MD of	High Level Regional Landfill	SE1-110-20 W5	780-927-3717
Minburn, County of	Vegreville Landfill	NW/21-52-14 W4	780-632-4033
Minburn, County of	Mannville Landfill	SW/16-50-9 W4	780-632-4033
Minburn, County of	Bonfuly Landfill	SE3-52-12 W4	780-632-4033
Mountain View County	Didsbury – (near airport)	SW/5-32-1 W5	403-335-3311
Newell, County of	Newell Regional Landfill	SE34-19-15 W4	403-362-2772
Newell, County of	Bassano Waste Transfer Station	SE19-21-18 W4	403-362-2772
Northern Lights, MD of	Boyle Waste Transfer Station	NW/5-86-24 W5	780-836-3348
Northern Lights, County of	North Star Transfer Station	NW/32-90-23 W5	780-836-3348
Northern Lights, County of	Hawk Hills Transfer Station	NW/21-94-22 W5	780-836-3348
Northern Sunrise County	Nampa Waste Transfer Station	E19-81-20 W5	780-322-3831
Northern Sunrise County	St. Isidore Landfill	SW/2-84-20 W5	780-322-3831
Paintearth, County of	Castor Waste Transfer Station	SW/5-39-14 W4	403-882-3211
Paintearth, County of	Coronation (Paintearth Resource Recovery Centre)	NE34-36-11 W4	403-882-3211
Parkland County	Stony Plain Landfill	SE35-52-1 W5	780-968-2231
Parkland County	Tomahawk County Yard	SW/13-51-5 W5	780-968-2231
Peace, MD of	Griffin Creek Landfill	SW/18-81-25 W5	780-338-3845
Pincher Creek, MD of	Cowley Regional Landfill	NW/8-7-1 W5	403-628-3849
Pincher Creek, MD of	Pincher Station	SW/1-7-30 W4	403-627-4151
Ponoka County	Bluffton Landfill	NE6-44-2 W5	403-783-3333
Ponoka County	Ponoka Waste Transfer Station	NE36-42-25 W4	403-783-3333
Provost, MD of	Provost Regional Landfill	SW/5-40-5 W4	780-753-2368
Red Deer County	Kerr Hill Waste Transfer Station	NE23-36-27 W4	403-350-2163
Rocky View, MD of	Bragg Creek Transfer Station	NE13-23-5 W5	403-520-7290
Rocky View, MD of	Langdon Transfer Station	108 Railway Ave East	403-520-7290
Rocky View, MD of	Irricana Transfer Station	SW/29-27-26 W4	403-520-7287
Saddle Hills County	Blueberry Waste Transfer Station	SE3-80-8 W6	780-864-3984
Smoky Lake County	Smoky Lake Landfill	NW/2-60-17 W4	780-656-3730
Smoky River, MD of	Father Landfill	NW/15-78-21 W5	780-837-2221 ext 115
Special Area #2	Sindoco Waste Transfer Station	SE24-22-3 W4	403-854-5627
Special Area #2	Rainy Waste Transfer Station	NW/16-31-14 W4	403-854-5627
Special Area #3	Dyen Waste Transfer Station	LSD3-27-27-4 W4	403-664-3618

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Municipality	Site	Legal land location	Contact
Special Area #3	Youngstown – Big Country Regional Landfill	SE29-29-9-W4	403-664-3618
Special Area #4	Monitor Waste Transfer Station	NW32-34-4-W4	403-577-3523
Spirit River, MD of	MD of Spirit River Landfill	SW31-77-5-W6	780-864-3500
St. Paul, County of	Mallaig Waste Transfer Station	NE24 60 10 W4	780-645-3301
St. Paul, County of	Evergreen Regional Landfill	NW16-56-10-W4	780-645-3301
Starland County	Rumsey Waste Transfer Station	SW24-33-21 W4	403-772-3793
Starland County	Michichi Waste Transfer Station	NW19 30 18 W4	403-772-3793
Stettler, County of	Stettler Regional Landfill	NW22 40 19 W4	403-742-4441
Strathcona County	Fort Sask. Recycling Station	11121 88 Ave. Ft. Sask.	780-417-7134
Sturgeon County	Sturgeon Regional Landfill (Roseridge Waste Mgmt)	SW36 55 25 W4	780-939-8325
Taber, MD of	Enchant Waste Transfer Station	NW16 14 18 W4	403-223-8735
Taber, MD of	Grassy Lake Waste Transfer Station	NW23 9 13 W4	403-223-8735
Taber, MD of	Taber Waste Transfer Station	SE12-10-17-W4	403-223-8735
Taber, MD of	Vauxhall Waste Transfer Station	SW12 13 16 W4	403-223-8735
Thorhild, County of	Thorhild	NE5 60 21 W4	780-398-3741
Two Hills, County of	Two Hills Regional Landfill	NE5 55 11 W4	780-657-3358
Two Hills, County of	Willingdon Seed Cleaning Plant	NE1 56 15 W4	780-657-3358
Vermilion River, County of	Marwayne Waste Transfer Station	SE34 52 3 W4	780-846-2244
Vermilion River, County of	Paradise Valley Waste Transfer Station	SW7-47-2-W4	780-846-2244
Vermilion River, County of	Vermilion Transfer Station	SW5 51 6 W4	780-846-2244
Vulcan County	Mossleigh Transfer Station	NW14-20-25-W4	403-485-3003
Vulcan County	Vulcan Waste Transfer Station	SW4 17 24 W4	403-485-3003
Vulcan County	Lomond Transfer Station	NE11-16-20-W4	403-485-2241
Vulcan County	Milo Transfer Station	SW6-19-21-W4	403-485-2241
Vulcan County	Champion Transfer Station	SW29-14-23-W4	403-485-3003
Wainwright, MD of	Wainwright – Andrukow Group Solutions	SW28 44 6 W4	780-842-4454
Wainwright MD of	Irma Shop Yard	5016 – 53 ave. Irma	780-842-4454
Wainwright MD of	Edgerton (across street from Viterra)	SW1-44-4 -W4	780-842-4454
Wainwright MD of	Chauvin Landfill	NW 9-43-1-W4	780-842-4454
Warner, County of	Border Seed Cleaning Plant	SW29 2 14 W4	403-642-3635
Warner, County of	Sunshine Seed Cleaning Plant	NW12 6 19 W4	403-642-3635
Westlock County	Westlock Regional Landfill	NE27-59-26 W4	780-349-3346
Wetaskiwin, County of	Peace Hills Waste Transfer Station	SW29-46-24-W4	780-352-3321
Wheatland County	Hussar Waste Transfer Station	NW1 24 20 W4	403-934 3321
Wheatland County	Standard Waste Transfer Station	SW10 25 22 W4	403-934-3321
Wheatland County	Strathmore Waste Transfer Station	NE34 23 25 W4	403-934-3321
Willow Creek, MD of	Willow Creek Regional Landfill	NW22-11-26-W4	403-687-2603
Woodlands County	Fort Assiniboine – County Yard	SW2 62 6 W5	780-584-3866
Woodlands County/Whitecourt	Whitecourt Regional Landfill	NW29-58-10-W5	780-648-2273
Yellowhead County	Parkcourt Waste Transfer Station	SE35-54-08-W5	780-325-3782

Notes: Some municipalities have other "temporary" sites for dropping off empty pesticide containers. Phone the municipal contact number for locations and operating hours.

Safety Precautions

Warning Symbols

Visual warning symbols on pesticide labels indicate the kind of harm that can result from pesticide misuse or mishandling. They alert the user to the degree of the hazard (by the shape of the border) and to the type of hazard (by the centre picture).

Flammable

The "fire" symbol is a warning that the pesticide is flammable or easily ignited. Keep the pesticide away from heat, sparks or open flames. Do not smoke while mixing or applying the product.

Explosive

The "exploding grenade" symbol indicates that the pesticide can explode, e.g. pesticide in pressurized cans. Explosive conditions may also be created by using Roundup or Rustler (glyphosate) in a galvanized steel spray tank.

Corrosive

The "corroded hand" symbol indicates that the pesticide is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect the skin and eyes when using these products.

Poisonous

The "skull and crossbones" symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

Pesticide Toxicity, Hazard and Risk

The terms "toxicity," "hazard" and "risk" do not all have the same meanings. Users of pesticides should understand the difference in meanings among these terms.

Pesticides vary in **toxicity** or the degree of being poisonous. How poisonous a pesticide is depends on its inherent chemical and physical properties.

The relative **hazard** of a pesticide depends on the toxicity of the pesticide, the dose received and the length of time exposed. No hazard exists when the pesticide container is sealed, but once the seal is broken and the pesticide is handled, exposure can occur, and a hazardous situation is created.

Risk of exposure is a function of how an individual handles the product. Although the hazard may be the same whenever a pesticide is being poured into the spray tank, the risk is different if one person wears a hard hat, goggles, respirator, nitrile gloves, waterproof apron and neoprene or rubber boots and the other person wears none of these. A knowledge of the toxicity of a product and the potential for personal exposure can be used to lower the risk of exposure. The user can control the risk by carefully managing the hazard. Even when highly toxic pesticides are used, if the degree of exposure is kept low enough, the risk can be kept at an acceptable level. The toxicity of the pesticide can't be changed, but the risk can be managed.

LD_{50} values are used to rate the toxicity of the pesticides. The LD_{50} is an abbreviation for the dose (expressed in milligrams per kilogram of body weight of the test animal) that is lethal to 50 per cent of the

The following table relates the oral LD_{50} value (mg/kg) of a pesticide to its toxicity symbol.

LD_{50} less than 500 mg/kg indicates high toxicity	LD_{50} 500 - 1,000 mg/kg indicates moderate toxicity	LD_{50} 1,000 - 2,500 mg/kg indicates low toxicity	LD_{50} greater than 2,500 mg/kg indicates very low toxicity
Danger Poison	Warning Poison	Caution Poison	

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group of test animals. For example, if a pesticide has an oral LD_{50} value of 10 mg/kg and the test animals each weigh 1 kg, 50 per cent of the animals would die of poisoning if each ate 10 mg of the pesticide.

The smaller the LD_{50} value, the more toxic the pesticide. The LD_{50} value usually refers to the active ingredient in the pesticide formulation. In this publication, the LD_{50} of the formulated product is also given when available.

Symptoms of Poisoning

Pesticide poisoning can be acute (due to a single, large dose, like an accident) or chronic (due to continued exposure over a long period). For example, chronic health problems may develop after long term exposure to pesticides low in toxicity. Accidental contact with a pesticide, however, will not necessarily lead to poisoning. Both types of poisoning can exhibit mild, moderate or severe symptoms as follows:

Mild poisoning symptoms: Mild symptoms may be vague and can be compared with a sickness such as influenza. Typical symptoms include nausea, headache, tightness of chest, loss of appetite and stomach cramps. These symptoms can be immediate or be delayed by 12 to 24 hours.

Moderate poisoning symptoms: These symptoms are usually more pronounced than mild symptoms. They include nausea, trembling, lack of muscle co-ordination, excessive saliva, blurring of vision, tightness of chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, tearing from eyes, profound weakness, rapid pulse and cough.

Severe poisoning symptoms: Severe symptoms are often more specific and require immediate hospital treatment. They include vomiting, diarrhea, excessive sweating, inability to breathe, convulsions, fever, intense thirst and coma. It is imperative to reduce exposure when using all pesticides whether they are highly toxic or have very low toxicities.

Reducing the Risk of Exposure to Pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

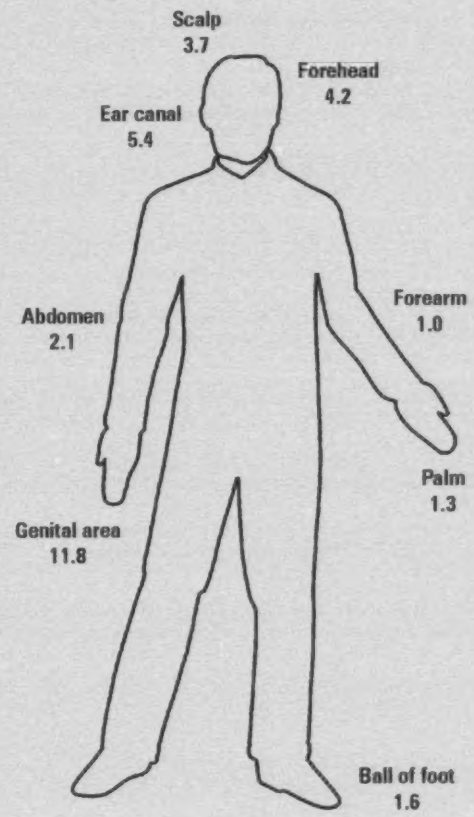
Skin

Absorption through the skin is the most common route of exposure. Different areas of the body absorb pesticides at different rates. For example, assuming the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 – almost 12 times greater than the forearm.

The genital area and the head are the areas where absorption is the greatest.

Absorption Rates

Compared to forearm, which is 1.0



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Reducing the risk of exposure through the skin is possible through the careful selection, use and care of protective clothing and safety equipment. Protective clothing and equipment can provide a barrier that reduces contact between the skin and pesticides. See the section on *Protective Clothing and Equipment* for recommended wear. To help reduce pesticide build-up, clothing should be washed daily using recommended procedures; see *Cleaning of Clothes and Equipment* section.

How skin is exposed to pesticides:

- Direct handling of pesticides – this includes any activity where the pesticide could come into direct contact with the skin, from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled; extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates, regardless of toxicity.
- Transfer from contaminated clothing or equipment – clothing worn during pesticide use should be restricted to that use only, thereby eliminating the possibility of continued dermal exposure due to pesticide residues remaining in the clothing. Some types of concentrated pesticides are not removed after multiple washings. Clothing contaminated by accidental spills of concentrated pesticide should be discarded rather than laundered. Avoid entering the house wearing contaminated clothing and equipment. Pesticides may be transferred from boots to floors and carpets where children and pets may be exposed.
- Transfer to other clothing during washing – always store and wash pesticide-contaminated clothing separately from the rest of the family wash as pesticides can be transferred to other clothing during the laundering process.

Protective Clothing and Equipment

Even pesticides not absorbed by the skin may still cause skin problems such as redness, blisters or dry scaliness, which may lead to serious skin eczema and dermatitis. Good personal hygiene is important to help minimize pesticide absorption through the skin. Shower, shampoo your hair and put on clean clothing immediately after you finish using pesticides for the day or after an accidental spill. Cuts and scrapes should be cleaned and bandages changed after handling pesticide to avoid possible dermal absorption from contaminated bandages.

Eyes

Eyes are very sensitive to pesticides and can be exposed to vapour or fumes, dust, spray drift, or accidental spills and splashes when containers of liquid concentrates are being opened or when the concentrated chemical is being poured into the sprayer tank. Do not wear contact lenses when mixing or applying pesticides.

Ears

Sprays and spills may contaminate the head and ear canal.

Nose

Pesticides can enter the body through breathing in fumes, dusts or spray mists. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs. To minimize exposure, respirators always should be worn when opening and mixing all concentrated pesticides. Read the pesticide label and follow the precautions outlined. A respirator may be required when applying pesticides.

Mouth

Pesticides can enter the body through the mouth when users eat, lick their lips or smoke when hands are contaminated. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisoned if they drink pesticides stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

Minimum Protection

A minimum level of protection is required when working with dilute, less toxic or granular pesticides. Where there is a direct contact with the pesticide, add extra protection.

Hard hat
(wide brimmed, no leather liner)

Coveralls
cloth or disposable (wear closed at neck, over long-sleeved shirt and full-length pants)

Gloves
unlined, nitrile or neoprene (cuff gloves and wear sleeves over gloves)

Boots
neoprene overboots or high rubber boots (wear pants outside boots)

Extra Protection

Extra protection is required for mixing, loading and handling pesticide concentrates, especially when working with highly toxic pesticides. Check pesticide label.

Goggles or face shield

Respirator
(check label if needed for less toxic pesticides)

Hooded coveralls
chemically resistant (when mixing, loading or applying very toxic pesticides and when application drenches applicator)

Waterproof apron
(when handling all concentrated pesticides)

Coveralls

Wear coveralls, closed at the neckline and wrists and over full-length pants and long-sleeved shirts, also worn closed at the neckline and wrists.

Minimum protection

- Cloth – if cotton or cotton/polyester coveralls are worn, they should be washed after daily use. Some pesticides are difficult to remove from cloth.
- Disposable, nonwoven – a number of limited use, disposable, nonwoven, hooded coveralls are now on the market; instead of laundering, they are disposed of at an approved landfill and thus, the problem of decontamination is avoided. Not all disposables are suitable for pesticide use, especially for liquid pesticides. Check with your supplier.

  Common disposable brands are Kimberly-Clark KleenGuard LP (Liquid Protection) and DuPont Tyvek. Both disposables provide an extra layer of protection. Check for comfort and size before purchase. Disposable coveralls are more fragile than standard ones and are only expected to last a limited number of wearings.

Extra protection

- DuPont's Tyvek QC (polyethylene coated Tyvek) and Tyvek/Saranex (saran coated Tyvek) provide greater durability and are more repellent to larger pesticide spills. However, they are more expensive and must be specially ordered. These coveralls are uncomfortable when worn for long periods in hot weather because of heat build-up and lack of breathability.
- Impermeable rainwear – two styles are available: coveralls or two-piece suits. They are similar in price to the more expensive disposable coveralls. Generally, they are a PVC (polyvinyl chloride) coating on nylon. Although excellent in liquid repellency, they too can be uncomfortable because they do not breathe and cannot be worn for long periods in hot weather. After use, they should be hosed down and washed with soap and water.

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Remember, When Using Disposable Coveralls . . .

- Before purchasing any disposable coveralls, make sure they are recommended by the manufacturer for pesticide use. Avoid wearing all-purpose disposables.
- When removing disposable coveralls, take care not to contaminate the interior if the coveralls are to be worn more than once. Between wearings, hang in a well ventilated area, away from other clothing.
- Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.
- Replace with a new coverall when severe pilling (balls of fiber on the surface), rips or holes occur. To discard, place in a plastic garbage bag and take to an approved landfill site; do not burn.

Gloves

Unlined gloves are required when handling, mixing or pouring concentrated pesticides, during field application and when equipment needs adjusting. Never use bare hands to do these jobs. Studies reveal that the greatest exposure is often through the hands. A variety of glove materials may be found on the market. Unlined nitrile and neoprene gloves are suitable for most pesticides. All gloves should be washed soon after the concentrated chemical has been mixed as pesticide may penetrate into the material if it is not cleaned off. Care should be exercised to avoid contaminating the interior of gloves when they are taken off and put on. If possible, wash the outside of the gloved hands prior to glove removal, to avoid contaminating the interior. At the end of the day, both the inside and outside of the glove should be washed.

Prior to use, inspect gloves and replace immediately if cracks, swelling, discolouration, holes or rips develop. Cuff glove and wear sleeves over top of gloves to help prevent spills and splashes of pesticides from running down inside the gloves.

Do not continue to wear contaminated gloves and avoid wearing leather, cloth or natural rubber gloves as they soak up the chemical and become a source of continuous contamination.

Boots

Neoprene overboots or long rubber boots are the recommended footwear as they are less likely to absorb pesticides and are more easily cleaned. Be sure to wear the pant leg over the boot to avoid pesticides running down into the boot. In case of such an accident, wash the boots out immediately; otherwise, wash the outside of the boots daily.

Minimum protection

Prevent powders, dusts or spray mists from being deposited on the hair or scalp by wearing a hard hat. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band.

Extra protection

Protect hair, scalp, ears and neck from dust, sprays and spill when you are likely to contaminate the head area. Wear a wide brimmed hat that covers the neck or hooded coveralls, with the hood under the hard hat. Only wear ear plugs if required for hearing protection. Use disposable ear plugs made of self-molding foam, and dispose of them after use.

Goggles or face shields

Protect the eyes and face against pesticide vapours, dust and splashes when handling concentrated pesticides. Goggles and face shields must have resistance to chemicals and have ventilation to prevent fogging. Clean after each day of use and store away from direct sunlight.

Avoid Wearing

(These materials absorb chemicals and prol. ..g exposure to the wearer; most are not easily cleaned).

- fabric baseball caps
- cloth or leather gloves, shoes or boots
- natural rubber or plastic gloves (not resistant to pesticides)
- leather belts, watch bands and cell phone holders
- contact lenses

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Respirators

Purchase a respirator recommended for the pesticides used and make sure it fits properly. A good airtight fit is required over the nose and mouth; beards and moustaches can prevent a close fit.

Respirators have two cartridges attached onto a facepiece. Each cartridge contains a pre-filter that removes dust particles and a filter of activated charcoal that absorbs the chemical. The cartridges should be unscrewed and replaced as soon as any odor of the pesticides is detected in the facepiece. Clean respirators after each day's use; unscrew the cartridges and wash the facepiece with soap and water. Rinse the facepiece in clean water, dry with a clean cloth and screw on the cartridges. The clean respirator should be stored away from direct sunlight in a sealed plastic bag to prevent cartridges from absorbing airborne contaminants. Disposable respirators are also available. Replace as soon as any pesticide odor is detected. Wash after daily use – do not get the charcoal filter wet. Store in a sealed plastic bag. Note: Gauze and dust masks are not respirators and are not recommended for pesticide use!

Gas masks

These are used when an applicator is likely to be exposed to very high levels of pesticides (fumigants). The face piece covers the eyes, nose and mouth. It is connected by a flexible hose to a charcoal canister worn on the belt. The lifespan of this canister is longer than that of the respirator cartridges. Manufacturer's directions are to be followed for cleaning and storing gas masks and canisters.

Minimize Exposure

- wear recommended protective clothing and safety equipment
- limit clothing worn for pesticide use to that use only
- wash clothing and equipment daily after use
- replace clothing and equipment that is no longer serviceable

Cleaning of Clothes and Equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

- handle soiled clothing with unlined, nitrile gloves
- remove pesticide granules from cuffs and pockets outdoors
- discard any garment saturated with pesticide concentrate
- temporarily store clothing in disposable plastic bags before washing
- take disposables to approved landfill

Washing pesticide soiled clothing

- wash daily
- wash separately from regular laundry
- pre-treat with a stain removal product if an emulsifiable formulation used, or
- pre-rinse on pre-wash cycle of washer
- avoid overcrowding washer
- use hot water setting
- use full water level and normal cycle
- use extra heavy duty detergent as recommended for heavily soiled loads
- repeat wash pr cedure
- clean washer after use (run empty washer through full cycle with hot water and detergent)

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Drying

- line dry to prevent contamination of dryer and increase the chemical breakdown of pesticide residues

Washing other equipment

- wash other equipment daily in hot soapy water: hard hat, goggles, apron, gloves, boots and respirator (avoid getting chemical wet; remove if possible)

Specific Cleaning Procedures for Pesticides

The standard washing procedure mentioned above reduces pesticides from contaminated clothing, but new research is gradually identifying more specific washing procedures to further reduce the residues on contaminated clothing or equipment. Note that each product requires unique washing procedures, and more testing is required for those that still have high residues remaining. Refer to the guide below:

Recommendations

1. 99 per cent residue is an unacceptable level. For better protection, choose a disposable coverall and discard after use.
2. Soak contaminated clothing in outlined biocleaner for required time. (Examples of this product are Odor Grab or Odor Bully).
3. Re-wear contaminated clothing before washing for work.
4. Fill 75 L washing machine with warm water (38°C); add 200 mL of Biocleaner Bleach. Soak for required time. Caution: loss of strength and colour results from bleach work; never re-use active days for colour polymers (bleach). Note: Acceptable levels of residue remaining – less than 5 per cent.

For further information on protective clothing for pesticide use, contact the Alberta Ag-Info Centre toll-free at 310-FARM (3276) or 1-866-882-7477.

Product	Suggested washing procedure	% Residue remaining
2,4-D (amine)	One wash	>1%
2,4-D (ester)	1/2 hour Biocleaner soak (2 chlorinated), one wash	18% (1)
Dacthal	One wash	1%
Dimethoate (Cygon, Rancher, Rymax)	1 hour bleach soak (4), one wash	>1%
Diuron	Ten wash (ECT) or Spray'n Wash soak, one wash	1%
Ipronlone (Rovral)	One wash	1%
Malathion (Malaxol)	Two washes	3%
Trallate (Avadex)	Spray'n Wash soak (3), two washes	18% (1)
Any concentrated pesticide	Discard	Too high

Source: Effective Pesticide Decontamination Procedures for Clothing, Equipment and Spills, Research Project Report, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Programs, 1994.

Other Precautions and Safety Tips

Pesticide exposure

Always carry a supply of fresh water in clean, up-ventilated spills and in case part of gloves for equipment adjustments.

Remote control devices

Devices (e.g. solenoid valves) can be installed to remotely control the sprayer, preferably from within the tractor cab. These devices can reduce operator exposure to pesticides.

Tractor cab cleanup

After spraying pesticides, the inside of the tractor cab, including wheel, etc.) can be decontaminated by wiping with warm soapy water and a sponge.

Tractor cab filters

Charcoal filters are available for fitting into the tractor air intake system, or filter out pesticides from the air entering the tractor cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and Haying Restrictions

Traditionally, pesticides have been registered for use on crops grown on cash-crop. Grazing or cutting of the treated crop for hay has not been considered in the intended use, so limited information on the maximum plant has not been registered in the organization process. If grazing or haying interval is considered in the registration process only if the grass cannot is to be fed to livestock. Consequently, many pesticide labels are currently silent about grazing, i.e. there is no statement on the label as to whether or not it is safe to graze the crop(s) listed on the label prior to harvesting. The absence of this information does not prohibit or suggest that short there is no specific warning with regard to grazing, it is still to do so.

Prevent pesticide (drifting) spray to avoid to drifting (e.g. by overspeed) over it the position. It does not fall or can not survive for 14 and 1. Therefore, it cannot be assured that if something is not used in the label, it is accepted for use. It can accepted can use only be used. Accept the limitations of intended time to suggest label use.

In light of the above, pesticide labels that are silent on grazing with and / for following statements. We can guess the treated crop is not for hay. Here are two additional data available to support such use.

Grazing date (DAT)

Are may be allowed to pesticides, including feed, as and associated cash related crops. Most grazing table of treated and said time or contemplating quantity of water from which time and. Many data is the according of use as the allowance data for animals to a substance. Many landscapes of crop laboratory, as they are another the time to quick have cash title of protecting time (...).

Farm Safety Program

For further information or more safety, please contact the Farm Safety Program in Illinois, Agriculture and Forestry at 1888 - 123 Street, Urbanaville, Illinois, 444 1-23.

Safety Equipment and Clothing

Protective clothing and equipment is available from the following:

Local 4-H or safety equipment supplies
Farm Bureau
1-800-xxx-xxxx
Local Safety Council
1-888-xxx-xxxx
Industrial Hygiene Inc.
1-888-xxx-xxxx

First Aid

Poison Information Centres

Standard First Aid Measures

Glossary of Terms in Pest Control

Alberta Agriculture Offices

Effective April 1, 2024

Toll-free in Alberta: 310-FARM (3276)

Head Office

Location	Address	Phone Number	Fax Number
Airdrie	[redacted]	[redacted]	[redacted]
Barrhead	[redacted]	[redacted]	[redacted]
Bonnyville	[redacted]	[redacted]	[redacted]
Brooks	[redacted]	[redacted]	[redacted]
Calgary	[redacted]	[redacted]	[redacted]
Camrose	[redacted]	[redacted]	[redacted]
Castor	[redacted]	[redacted]	[redacted]
Claresholm	[redacted]	[redacted]	[redacted]
Cochrane	[redacted]	[redacted]	[redacted]
Drayton Valley	[redacted]	[redacted]	[redacted]
Drumheller	[redacted]	[redacted]	[redacted]
Edmonton	[redacted]	[redacted]	[redacted]
Edson	[redacted]	[redacted]	[redacted]
Fairview	[redacted]	[redacted]	[redacted]
Fort Saskatchewan	[redacted]	[redacted]	[redacted]
Grande Prairie	[redacted]	[redacted]	[redacted]
Hanna	[redacted]	[redacted]	[redacted]
High Level	[redacted]	[redacted]	[redacted]
High Prairie	[redacted]	[redacted]	[redacted]
Lacombe	[redacted]	[redacted]	[redacted]
Lethbridge	[redacted]	[redacted]	[redacted]
Medicine Hat	[redacted]	[redacted]	[redacted]
Olds	[redacted]	[redacted]	[redacted]
Peace River	[redacted]	[redacted]	[redacted]
Pincher Creek	[redacted]	[redacted]	[redacted]
Rimbey	[redacted]	[redacted]	[redacted]
Rocky Mountain House	[redacted]	[redacted]	[redacted]
Slave Lake	[redacted]	[redacted]	[redacted]
Spirit River	[redacted]	[redacted]	[redacted]
Stettler	[redacted]	[redacted]	[redacted]
Strathmore	[redacted]	[redacted]	[redacted]
Taber	[redacted]	[redacted]	[redacted]
Vegreville	[redacted]	[redacted]	[redacted]
Vermilion	[redacted]	[redacted]	[redacted]
Wainwright	[redacted]	[redacted]	[redacted]
Westlock	[redacted]	[redacted]	[redacted]
Whitecourt	[redacted]	[redacted]	[redacted]

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Chemical Weed Control in Alberta

Chemical weed control functions on the basis that certain chemicals are capable of killing some kinds of plants (weeds) without injury to other kinds (crops). As a group, these chemicals are called herbicides.

Herbicides are effective tools for the control of weeds, and **herbicides demand respect.** When properly used, herbicides can safely and effectively accomplish their objective; misused, they can cause severe economic loss. The misuse of herbicides is usually due to:

- ignorance of their characteristic activity and/or
- carelessness in their application

Misuse includes such factors as applying improper dosages; using the wrong herbicide; failure to properly calibrate application equipment; failure to wash application equipment thoroughly before switching herbicides; improper soil incorporation; timeliness of application, with respect to the growth stage of crop or weed.

This guide lists the major herbicides registered for field crop use in Alberta. Refer to product labels attached to the herbicide containers for final detailed information.

Conservation tillage and herbicides

Conservation tillage is a general term used to describe a cropping program in which some or all of the tillage operations are replaced by using herbicides to control weed growth while, at the same time, preventing soil erosion and conserving soil moisture. The following terminologies are included under conservation tillage: reduced tillage, minimum tillage, no-tillage or zero tillage, direct drilling and chemical fallow.

Herbicides for conservation tillage are listed below. Rates of application, weeds controlled and other pertinent information can be found by referring to each herbicide in this guide.

- **2,4-D or MCPA** – To control winter annuals such as flixweed, shepherd's-purse and stinkweed. Application should be made to emerged weeds prior to freeze-up.
- **glyphosate Formulation** – Apply any glyphosate formulation mixed with a non-ionic surfactant (if required) to actively growing weeds. Can be tank mixed with Banvel; 2,4-D amine; Pardner.
- **Rustler** – Controls annual grasses, broadleaf weeds and volunteer cereals. Can be tank mixed with 2,4-D.

Nitrate poisoning of livestock

Nitrate accumulations may be caused by leaf damage from frost, hail or herbicide action. Symptoms of nitrate poisoning include reduced milk production and growth rate, abortions and in severe cases, death by suffocation. A veterinarian should be called immediately if livestock show unusual symptoms when they are fed forages that may contain nitrates.

After severe frost, hail or herbicide damage, the nutrient value of the crop will decrease rapidly. In terms of nutrition, it is important to harvest as soon as practical; however, in the case of herbicide treated crops, there may be a waiting period specified on the herbicide label. Especially in the case of high risk crops, such as oats or corn, a delay may be advisable to permit nitrate levels to decrease. If there is a possibility of high nitrates in feed, have the feed analyzed at a feed testing laboratory.

Weed control in forage crops

Make sure all forages, as well as any companion crops, present in the stand are listed for the intended use on the herbicide label. Follow the label directions on the herbicide container closely, especially for stage of crop and weed development, Water Volume, Grazing and feeding restrictions.

Herbicide performance ratings

Herbicide performance ratings (numbers in brackets after the names of crops or weeds) are based on data from the Expert Committee on Weeds (Western Section) Research Reports. These numbers are not absolute and, therefore, not a guarantee of expected performance. They are meant to be used as a guide when selecting a herbicide. When a number is not included, there is not sufficient data to provide a rating.

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Tolerance of crop to herbicides
The number appearing in brackets following the crop on which each herbicide is registered represents the expected tolerance of the crop to that herbicide. Due to variations in variety, weather, timing and application techniques, this number is only approximate. 0 = complete kill of the crop and 9 = no measurable injury to the crop.

Level of weed control with each herbicide
The number appearing in brackets after each weed represents the average level of weed control expected with the herbicide. Due to variation in weather, growth stage, time of day, application technique, etc., this number is only approximate. 0 = no control of the weed and 9.0 = complete kill of the weed. A weed control rating of 7.0 or greater is considered commercially acceptable.

Water Used for Spray Application

The quality of water used can affect the efficacy of some herbicides. Water quality includes the cleanliness (silt, organic matter and soil), the hardness or softness of the water and the water pH.

Some herbicides, including glyphosate containing herbicides, adsorb to silt and organic matter, become inactivated. This causes a decrease in herbicidal activity. Suspended soils and organic matter in water is usually a problem where surface water is being used.

Other herbicides, including 2,4-D amine and several Group 1 herbicides have reduced efficacy when applied in mineralized water. Minerals include both calcium and magnesium sulfates, which result in 'hard' water, and excessive sodium bicarbonate, which results in 'soft' water. Mineralized water is most commonly a problem when well-water is used. When efficacy decreases, it is most apparent on hard to control weeds and is easily confused with late application, poor growing conditions or reduced herbicides rates.

The pH of water or water temperature can affect the ability of some herbicides to stay dissolved in the spray solution. To avoid these problems, the manufacturer will suggest a specific order to add surfactant or mixtures of products. For example, to mix the herbicide Horizon, the herbicide is added first, followed by the surfactant, Score, and all mixing is done under agitation. Other water conditioners out there include Choice Weather Master and N-Tank. Follow label recommendations for mixing. Products cannot work unless they are dissolved or miscible (capable of being mixed) in the water. Also, if products are not in solution they can form a sludge in the spray tank and block nozzles.

It is best to avoid using poor quality water if possible; however, the following remedies can limit the loss of herbicidal activity.

Herbicide and Water Quality

Herbicide	Quality concern	Remedy
2,4-D amine*	Mineralized water	Use a non-ionic surfactant like Agral 90
Achieve (tralkoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Poast (sethoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Roundup/Touchdown	Mineralized water	Add ammonium sulfate fertilizer 3 kg/100 L application solution
Roundup/Touchdown	Silty or dirty water	Filter water or use clean water
Select (clethodim)	Mineralized water	Add ammonium sulfate (1% v/v)

* **Note: 2,4-D Ester formulation is not affected.**
Information primarily derived from F. A. Holm, J. L. Henry, D. W. Gruber and P. McMullan, 1995 Water quality effects on phenoxy and ACCase inhibiting herbicides. Proceedings of the Weed Research/Symposium, University of Alberta.

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Pesticide Resistance

The Problem

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. Resistance occurs when some pests survive a pesticide application; this part of the population is naturally more tolerant to the chemical. These individuals reproduce and create a population that is resistant to the pesticide. Producers should follow agronomic practices that both prevent or minimize the development of resistance and prevent the spread of existing resistant populations.

Since the first documented case of chickweed resistance in the mid 1980's, the numbers of herbicide resistant weeds, fungicide resistant diseases and insecticide resistant bugs have increased and the area infested by them continues to grow. At present in Alberta, more than 10 weed biotypes are resistant to chemicals from six herbicide groups. Potato blights are known to have developed resistance to common fungicides. Some insect pests are resistant to the *Bacillus thuringiensis*, a common biopesticide. In addition, some resistant pests are resistant to more than one pesticide group (see table below). It is essential that producers be able to identify these resistant pests and take action to minimize or prevent the development of resistance on their farms.

How to identify herbicide resistance

Investigate all areas of the sprayed field where weed control did not occur. Rule out other factors that might have affected herbicide performance including mis-application, spray misses, unfavorable weather conditions, herbicide application at an improper leaf stage and weed flushes after application. If resistance remains a likely possibility, check for the following:

- Are other weeds listed on the product label controlled satisfactorily?
- Is herbicide failure patchy with no reasonable explanation?
- Did the same herbicide or herbicide group fail in this area of the field in the previous year?
- Do weeds show herbicide injury symptoms such as root pruning by a Group 3 herbicide or yellow/purple coloration caused by Group 2 applications. Resistant weed biotypes will not show these typical injury symptoms.
- Do field histories indicate extensive use of the same herbicide (or herbicide group) year after year?

How to minimize the development of resistance

Follow the guidelines below to delay the appearance of resistance:

- **Integrated weed management practices** – use herbicides as part of an integrated control program that includes scouting, historical information related to herbicide use and crop rotation, and consider mechanical, cultural, biological and other control practices.•
  Herbicide and crop rotations – herbicides must be rotated. It is important not only to use a different herbicide, but to use one from a different herbicide group with a different mode of action.
- **Field history** – records are needed to make sensible decisions on herbicide rotation and to evaluate the probability of resistance developing. A pesticide application record sheet can be found at the back of this book.
- **Tank mixture** – a tank mix may delay the appearance of resistant weeds if the components of the tank mixture control the same weed by a different mode of action.
- **Monitor results** – Monitor treated weed populations for resistance development.
- **Preventive measures** – prevent the movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment as well as planting clean seed.

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Herbicide Resistent Weeds in Alberta

Herbicide group	Weeds
Group 1	Green foxtail, wild oats
Group 2	Ball mustard, chickweed, cleavers, hemp-nettle, kochia*, Russian thistle, spiny annual sow thistle, stinkweed, wild mustard, wild oats
Group 3	Green foxtail
Group 4	Hemp-nettle
Group 8	Wild oats
Group 1 + 2 + 25 (multiple resistance)	Wild oats
Group 1 + 2 + 8 + 25 (multiple resistance)	Wild oats
Group 1 + 3 (multiple resistance)	Green foxtail
Group 2 + 4 (multiple resistance)	Cleavers
Group 9	Kochia

- **NOTE:** There is now a confirmed case of gylphosate resistance(Group 9) in kochia in Southern Alberta. Other cases of glyphosate resistance have been reported in Ontario with giant ragweed and Canada fleabane.
- Surveys of prairie kochia fields have found that approximately 90 per cent have Group 2 herbicide resistance. Without testing assume kochia found in Alberta is resistant as well and needs to be controlled with herbicides from a different herbicide group.

Herbicide resistance screening on suspect weeds can be performed by the Saskatchewan Crop Protection Lab (306-787-8130) for a fee, ranging from $35 to $100 per sample. Or contact the chemical company or the Alberta Ag-Info Centre toll-free at 310-FARM (3276).

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Herbicide Group Classification by Mode of Action

Chemical family	Active ingredients	Found in*			
Group 1	**Inhibitors of acetyl CoA carboxylase (ACCase). These chemicals block an enzyme called ACCase. This enzyme helps the formation of lipids in the cells of grass plants. Without lipids, susceptible weeds die.**				
Aryloxyphenoxy propionate (FOP)	clodinafop propargyl	Bulkstop Cougar FootHills DS Harmony Grass 240	EC Harmony X Harmony Max Harmony SG Horizon DS	Ladder MPower Aurora NextStep DS Signal D	Signal FSU Signal M Traxos
	fenoxaprop-p-ethyl	Bengal Cardon	MPower Herbicil Puma Super	Puma Advanced Tundra	WildCat Vigil
	quizalofop-p-ethyl	Assure II	Yuma		
Cyclohexanedione (Dim)	clethodim	Arrow 240 EC	Centurion	Select	Shadow 9756
	sethoxydim	Poast Ultra	Odyssey Ultra		
	tralkoxydim	Axial Liquid Achieve	Maranga Nufarm Tralkoxydim		
Phenylpyrazolin (Den)	pinoxaden	Axial Axial PUS	Axial Xtreme BreakBurst	Traxos Traxos Two	
Group 2	**ALS/AHAS inhibitors. These chemicals block the normal function of an enzyme called acetolactate (ALS) acetohydroxy acid (AHAS). This enzyme is essential in amino acid (protein) synthesis. Without proteins, plants starve to death.**				
imidazolinones	AC 299, 263 (29 A)	Altitude FX			
	imazamethabenz	Assert 200	Avert		
	imazamox	Aves Sakota	Solo Tenoble	Viper	
	imazamox + imazethapyr	Odyssey	Odyssey Ultra		
	imazapyr	Arsenal	Aves	Sakota	
	imazethapyr	Gladiator Multistar	MPower Kamikaze No Image Herbicide	Pursuit	
Sulfonylamino carbonyltriazolinones	flucarbazone sodium	Everest Inferno Duo	Para		
Amide	dimethenamid-P	Outlook			
Sulfonylurea	chlorsulfuron	Telar	Tracist		
	ethametsulfuron-methyl	Muster			
	metsulfuron-methyl	Accurate Ally Tess-Ki-Go	Escort Express Pre	Nuance Pro Reclaim	Tweather
	nicosulfuron	Accent			
	rimsulfuron	Prism	Titus Pre		
	tribenuron-methyl	Barricade Boost Brookside Depby	Fusilade II Harmony Max Harmony SG Nimble	Predicade Refine SG Reliant Traxotex	Triton C
	tribenuron-methyl	Barricade Boost Brookside Depby Express FX Express Pack Express Pre	Express SG FirstStep Complete Harmony X Harmony Max Harmony SG Inferno Duo Inferno WDG	Kuflot MPower X MPower X Nimble Nuance Nuance Pro Predicade	Refine SG Refine W Reliant Signal FSU Triton C Triton X
	triflusulfuron-methyl	UpBeet			
Pyrazole	halosulfuron	Permit			
Triazolopyrimidines	florasulam	Basulcrwerk Eddy BreakBurst Frontline	Frontline XL Frontline 2,4-D Kumax Outshine	Paradigm PrePass PrePass Pak Priority	Spectrum Synthe Stellar Taglinar
	pyroxsulam	Simplicity	Tandem		
Triazolones	thiencarbazone-methyl	Predicade	Varro	Velocity m3	

* A herbicide may appear in more than one group if it contains more than one active ingredient.

(continued)

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Herbicide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Trade Names*			
Group 2	**Acetolactate synthase inhibitors. These chemicals inhibit the cell division in roots**				
Sulfonylureas	amidosulfuron	Hoja			
	orthosulfuron	Amasa	Fortress	Krud	Sultra
Group 9	**Synthetic auxins. These chemicals disrupt plant cell growth in the woody forming shoots and leaves; they affect protein synthesis and normal cell division, leading to malformed growth and lesions.**				
Benzoic acids	dicamba	Banvel II Diablo Cyclet Cyclet 720g Kyanos 75	Dicamba Hamaica II Havelock Power Kamo Viande Dicamby	Fidax Fusilier Lionel Target WDM	Tordon XP Vidon II Weigondi WXD 345
Carboxylic acids	clopyralid	Lontrel 90 X-Spray II Yak Trick	Lontrel Wamadown Prestige	Prestige 40 Vetrol	Spectrum Strude
	aminopyralid	Redpro	Redpro II		
	fluroxypyr	Attitude 210 Attain 40 Avail Xtreme Barricade Iveknow II Iveknow XP	Fluxx 24 Hamaica Max Hak Trick Wamadown Iveknow Pluxen	Fluxfoxade Prestige 40 Fidax Retain 200 Rush 40 Signal F200	Sidax Spidox Vanadley Vanox Trek Vaphy
	picloram	Grazon	Tordon 225		
Pyridine acid	halauxifen	Foxtrotgrain	Pluxen		
Phenols	2,4-D	2,4-D Agricone Attain 40 Beachmaster Cyanox Amine Dasomone	Dichlorprop-DH Cyclet 720g Iveknow II Intagrop XP Fluxx 24 Fluxfoxe 2,4-D	Redstone II Retain 200 Vetrol Vortex Lexide Redpro	Signal K Tricelate<
Tryscept Vidon II Vortexprop 600
	dichlorprop-P (2,4-DP)	Dasomone Dichlorprop DH	Intagrop XP	Spidox Trio	Vortexprop 600
	2,4-DB	2,4-DB	Tordon 225	Cyanox 225	Embolay 225
	MCPA	Attitude 210 Badge Broadcade Buxtril M Clandox Plus Lontrel M Cyclet Iveknow M Fruxfoxe	Fluxfoxe XL Gathomp Hak Trick Horizon MCPA<
Logic M MCPA Mecmol Spidox Trio Cyclet	Pluxen Fruxfoxade Prestige 40 Refine M Rush M Signal XL Spectrum Stellar Vetrol	Target Tordon XP Tyrone Tyscide Vaphy Vulplex Plus
	MCPB	Clandox Plus	Tyscide	Tryplex Plus	
	mecoprop (MCPP)	Cyclet 720g Mecgrop-P	Spidox Trio Vetrol	Target Tordon XP	
	quinclorac	Clean	Fluxfoxe Quinclorac	Vidon II	
	aminocyclopyrachlor	Vastol	Tryscil		

* A herbicide may appear in more than one group if it contains more than one active ingredient.

(continued)

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Herbicide Group Classification by Mode of Action

Chemical Family	Active Ingredient(s)	Trade Name[1]			
Group A	Photosynthesis inhibitors at Photosystem II, site A Weak broadleaf, grass and sedge control with some postflower and through shoot growth; chlorosis leading to death				
Phenyl carbamates	desmedipham	Betanex	Betanex II		
	phenmedipham	Betanex	Betanex II		
Triazines	atrazine	Aatrex	Lextrex	Triazone II Magnum	
	simazine	Princep Nine-T	Simazine 4Flo		
Triazinones	hexazinone	Velpar DF	Velpar DF XL		
	metribuzin	Sencor	Tricor 75DF		
	pmetrozin	Frontrow			
Uracils	bromacil	Hyvar	Hyvar X-BG	Bromacil	
Group C	Photosynthesis inhibitors at Photosystem II, site A				
Benzothiadiazinones	bentazon	Basagran	Basagran Forte	Lescolin	Storm
Nitriles	bromoxynil	Agroxynil Lontrel Flo Maxtril Brominil Bromotril II	Buctril 240 Buctril EW Compitril Hitrobrom II Hitrobrom 240	Attitude Bull Lontrel Logic 240<
Marvel	Nortrel Pardner Pinnacle<
Stinger 240
Group F	Photosynthesis inhibitors at Photosystem II, site D				
Ureas	diuron	Diuron 4L	Karmex 4F	Diuron	
	fluometuron	Cotoran	Lorox		
Group H	Lipid synthesis inhibitors, cell division inhibitors. Some absorbed mainly by soil microbes and degraded by dry seedling shoots before they emerge; shoot growth				
Thiocarbamates	EPTC	Eptam			
	molinate	Ordram	Ordram 15%Granular Herbicide		Yuntaro
Group G	Inhibitors of EPSP synthase. Some absorbed mainly by roots and translocated				
Ureas	glyphosate	Glyfos 41 Glyphosate Touch Up Longbow 41 Fortilay Complete Glyphogan Plus Xplore Xplosive	Knockout Extra Mytox Glyphosate 41 Diffusion Glyphosate Flow Polaris Polaris Complete Fortilay	Glyphogan Mytox Transgenic 41 Roundup Weed Roundup Glyphosmoothe Roundup XP 1GB Weedmaster	Weedmaster Plus Mytox Mytox Touchdown Total Yuntaro Glyfogan Plus Max 41 Mytox

[1] A herbicide may appear in more than one group if it contains more than one active ingredient. (continued)

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Alcoholic Drugs Classification by Effects on Cell Cycle

Chemical Family	Active Ingredients	Trade Name
Group I A	**Inhibitors of microtubule polymerization**	
Vinca	[illegible]	[illegible]
Group I B	**Taxanes: stabilize cell microtubule formation**	
Taxanes	[illegible]	[illegible]
Group I C	**Inhibit the assembly of microtubules and mitotic spindle formation**	
Epipodophyllotoxins	[illegible]	[illegible]
Camptothecin	[illegible]	[illegible]
Topotecan	[illegible]	[illegible]
Irinotecan	[illegible]	[illegible]
Group I D	**Inhibitors of cell growth and division**	
Hydroxyurea	[illegible]	[illegible]
Procarbazine	[illegible]	[illegible]
Group I E	**Asparaginase**	
Escherichia coli Asparaginase	[illegible]	[illegible]
Group I F	**Drugs that act through cell membrane receptors**	
Glucocorticoids	[illegible]	[illegible]
Group I G	**Inhibit nucleic acid synthesis, affecting cell division and growth**	
Methotrexate	[illegible]	[illegible]
Group I H	**Inhibit nucleic acid synthesis by cross-linking of strands, by cleavage of strands, or by competing for nucleotide binding sites**	
Alkylating agents	[illegible]	[illegible]
Group I I	**Antibiotics that intercalate into DNA to produce breaks in DNA strands and free radicals**	
Anthracyclines	[illegible]	[illegible]
Bleomycin	[illegible]	[illegible]

* Antibiotic may appear in more than one drug group if it exhibits more than one action mechanism.

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Accessories

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Images, Recording and Videos

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Blends, Grains and Foraging

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Emerald Loaves

Makes 2 × 900 g loaves (Allow at least 3 days)

Rustic Sourdough Loaves

Makes 2 × 900 g loaves (Allow at least 3 days)

Wholemeal Loaves Sourdough Variation

Makes 2 × 900 g loaves (Allow at least 3 days)

Malt Loaves

Makes 2 × 1 kg loaves (Allow at least 3 days)

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Applications of Innovations

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Weeds Controlled

annual smartweed	lamb's quarters	volunteer clover	wormseed mustard
common purslane	ragweed	wild oats	wild mustard
kelp's thistle	redroot pigweed	wild buckwheat	

Registered Tank Mixes

Fertilizers. For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged as there is danger of liquid fertilizer causing crop injury.

Many dry bulk granular fertilizers may be impregnated with Autrow or Autrow plus Dual II Magnum or Eradicane 8E as a pre-plant incorporated application to control weeds in corn.

Other post-emergent (post-emergent treatment): Atrazine 480.

Pre-plant incorporated: Autrow Liquid 480 (0.85 – 1.25 L/acre) + Dual II Magnum (0.5 – 0.7 L/acre).

Application Tips

Continuous gentle agitation is needed. Avoid excessive agitation, especially with oil mixtures as a grease-like mass may form. Use all mixes at once, and clean tank and system with a strong detergent solution. Use 50 mesh or larger strainers and no only metal filters. Bypass line should discharge to bottom of tank. Band treatments are desirable when cultivation is to alleviate hard soil conditions or to control annual weeds.

How it Works

A systemic herbicide absorbed through both roots and foliage, and it is translocated to the leaves where it inhibits photosynthesis.

Expected Results

Affected plants are slow to emerge and are wilted, yellowish and eventually, turn brown and die. Poor weed control may be expected if improper incorporation is done, or when post-emergent application is made without oil concentrate or sprayed too late. Heavy rainfall or sandy soils may cause leaching and a decrease in weed control and/or crop injury.

Restrictions

Re-cropping. Plant only to corn in year of treatment. The use of atrazine on the prairies is not recommended when corn is grown in rotation with other crops except tolerant canola. Breakdown of atrazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets) one or more years after application. Crops most tolerant after corn and tolerant canola are sorghum, then flax, fallow beans and peas. The risk of damage to succeeding crops from atrazine residues may be reduced by ploughing or deep-tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the atrazine levels. Uneven application, excessive spray overlap or applications in excess of recommended rates will not injure corn but may result in a longer carryover of atrazine residues. A prolonged period of dry weather will also lengthen the time that atrazine residues remain in the soil. **Rainfall:** Rainfall will activate the chemical, carrying it into the root zone where kill will begin. **Grazing:** Do not graze treated immature crops or cut for fodder.

Environmental Precautions

Leave at least a 10 m buffer between treated area and sensitive habitats. Do not mix or load within 30 m of any wells and aquatic habitats such as lakes, ponds, dugouts or sinkholes. Heavy rainfall on sandy soils may cause runoff and leaching. The use of atrazine may result in contamination of groundwater particularly on areas where soils are permeable (e.g., sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow.

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) Autrow > > 5,000 mg/kg. May cause eye irritation. Very low toxicity to fish and birds.

Storage

Heated storage required. If stored in unheated areas, the product should be warmed and agitated thoroughly prior to using.

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Accent

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size	Acres treated by one pouch
Accent (PCP# 28198)	*E.I. duPont Canada*	Nicosulfuron (75%)	Water dispersible granules	133.6 gram (4 x 33.4 g water soluble bags	10 acres

Crops, Staging and Rates

Crop	Stage	Rate
Field corn	1 - 8 leaves* (8 visible collars)	13.5 g/acre plus 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf)
Sweet corn**	1 - 6 leaves* (6 visible collars)	

* The coleoptile (short, blunt leaf) is counted as the first leaf. ** Accent is registered on all sweet corn varieties; however, tolerance may vary depending on variety. Refer to seed supplier for variety tolerance.

Weeds and Staging

Weeds	Staging
barnyard grass fall panicum	1 - 6 leaves (up to 2 tillers)
green foxtail	1 - 6 leaves (up to 2 tillers)
old witchgrass	1 - 6 leaves (up to 2 tillers)
quackgrass	2 - 6 leaf stage (10 to 20 cm in height - leaf extended)
wild oats	2 - 6 leaves
yellow foxtail (suppression)	1 - 6 leaves (up to 2 tillers)

Registered Tank Mixes

Accent (13.5 g/acre) + Basagran (0.24 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).

Accent (13.5 g/acre) + Pardner (0.4 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume:** 40 L per acre.

Application Tips

Warm, moist conditions following application promote the activity of Accent, while cool and/or dry conditions may reduce or delay activity. Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather, environmental conditions such as drought, water-saturated soils, hail damage or frost, disease, insect or nematode injury and prior herbicide, or carryover from a previous year's herbicide application. Delay application until stress passes and both weeds and corn resume growth. If corn has been injured by frost, wait 48-72 hours before applying Accent. Severe stress conditions immediately following application may also result in crop injury or poor weed control. Do not apply a foliar organophosphorus insecticide within 7 days before or after applying Accent.

How it Works

Accent is a systemic herbicide that is absorbed by the foliage and translocated to the growing points of the plant. Growth of susceptible plants stops shortly after application. Accent rapidly stops the growth of susceptible species; typical symptoms usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending on the prevailing growing conditions.

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Accent (cont'd)

Expected Results

Typical injury symptoms include yellowing, purpling and reddening of the newest leaves and usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending upon the prevailing growing conditions. Eventually the entire plant discolours and dies.

Restrictions

Rainfall: A rain-free period of 2 - 4 hrs is needed after application. **Grazing:** Do not graze treated crops or cut for hay. **Pre-harvest Intervals**: Do not harvest field corn until 30 days and sweet corn for 40 days after application. **Re-cropping Restrictions:** Winter wheat may be seeded 4 months after application. Barley, corn, spring wheat, canola, soybean, sorghum, white beans, red clover and alfalfa may be seeded 10 months after application. For all other crops a field bioassay is recommended before planting. For all other crops including sugarbeets, a field bioassay is recommended before planting. Do not plant sugarbeet until a field bioassay indicates it is safe to do so.

Environmental Precautions

Accent is toxic to terrestrial plants and aquatic organisms. Leave a buffer zone of at least 2 m between the downwind point of direct application and the closest edge of sensitive terrestrial and aquatic habitats.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a dry place. Keep water-soluble bags in original outer container or bag away from moisture.

Achieve (Liquid Achieve SC)/ Bison 400L/Marengo/Nufarm Tralkoxydim

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Liquid Achieve SC (PCP# 28566)	Dow AgroSciences	Tralkoxydim: 400 g/L	Suspension concentrate	2 x 8 L or 96 L
Bison 400L (PCP# 29256)	ADAMA Canada	Tralkoxydim: 400 g/L + Addit adjuvant	Suspension concentrate	96 L drum + 12 x 8 L Addit
Marengo (PCP# 29289)	Loveland Products	Tralkoxydim: 400 g/L	Suspension concentrate	1 x 8 L Marengo + 1 x 4 L Turbocharge
Nufarm Tralkoxydim (PCP# 30176)	Nufarm Agriculture Inc.	Tralkoxydim: 400 g/L	Suspension concentrate	1 x 8 L + 1 x 4 L Nufarm Tralkoxydim Adjuvant

One case of Liquid Achieve will treat 80 acres. Always check and read label rate and package sizes with different product packaging.
One case of Nufarm Tralkoxydim treats 40 acres and includes adjuvant.

Crops, Staging and Rates

No staging restrictions. Apply at 200 mL/acre plus adjuvant.

barley (all 2 or 6 rows)
durum wheat (all varieties)
fall rye
spring rye
spring wheat (all varieties)
triticale
winter wheat all varieties

Underseeded crops

Apply at 2 - 4 leaf stage of the forage legumes and grasses

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Cereal crops underseeded to forage legumes (if not tank mixed with broadleaf herbicides)
alfalfa | bird's-foot trefoil | clover | sainfoin

Forage grasses underseeded to cereals or grown alone
crested wheatgrass | intermediate wheatgrass | creeping red fescue | meadow and smooth bromegrass (seed production)

Weeds, Rates and Staging

Weeds	Stage
barnyard grass Persian darnel	1 - 4 leaf
green foxtail yellow foxtail	1 - 5 leaf
volunteer oats wild oats	1 - 6 leaf

Rate

200 mL per acre of Liquid Achieve/Bison 400L/Marengo/Nufarm Tralkoxydim. Add Intake at a rate of 0.66% v/v or 0.66 L per 100 L spray solution or ADAMA Addit or Nufarm Tralkoxydim adjuvant at a rate of 0.5% v/v or 0.5 L per 100 L spray solution to Liquid Achieve/Bison 400L/Marengo /Nufarm Tralkoxydim. When water analysis indicates bicarbonates levels are 400 ppm or greater, add ammonium sulfate at 0.75 - 1.5 kg/100 L (7.5 - 15 lb/100 gallons) of spray water prior to mixing.

Registered Tank Mixes

For all tank mixes, use 0.2 litres Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim plus the following:

Tank mix partner	Product rates	Crop stage
2,4-D ester	400 m L/acre (600 g/L formulation)	4 leaf to flag leaf stages
Attain XC/Flurox 24	Attain XC A: 95 - 130 mL/acre + Attain XC B: 260 - 340 mL/acre; Flurox 24 - 180 mL/acre fluroxypyr + 260 mL/acre 2,4-D	4 leaf to flag leaf stages
Buctril M/Bromotril II	Buctril M: 400 mL/acre, Bromotril II: 500 mL/acre	Apply between 2 leaf to early flag leaf
Curtail M	810 mL/acre	Apply between 3 leaf to early flag leaf
Dichlorprop plus 2,4-D ester	710 mL/acre	Prior to 4 leaf stage of the crop
Enforcer D	Enforcer D: 250 - 500 mL/acre	4 leaf to early flag
Enforcer M	Enforcer M: 250 - 500 mL/acre	2 leaf to early flag
Infinity	334 mL/acre	Apply at the 1 to flag leaf stage
Lontrel + MCPA ester	Lontrel: 110 mL/acre + MCPA ester 500: 450 mL/acre	Apply between 3 leaf expanded to flag leaf
MCPA ester 500	450 mL/acre	Apply between 3 leaf to early flag leaf
Matador	24 - 32 mL/acre	
Mextrol 450/Logic M, Badge, Mextrol 400	450 mL/acre 560 mL/acre	Spring wheat (including durum) and barley: 2 leaf to early flag leaf
OcTTain XL	450 mL/acre	4 leaf to flag leaf stages
Pardner	Pardner: Maximum rate of 390 mL/acre, Bromotril, Brotex, Koril: maximum rate of 500 mL/acre	
Pixxaro	125 mL/acre Pixxaro A + 235 mL/acre Pixxaro B	Spring wheat, barley: 2 leaf to flag leaf
Prestige XC	Prestige XC A: 130 - 170 mL/acre + Prestige XC B: 600 - 800 mL/acre	Spring wheat and barley: 3 leaf to early flag leaf
Trophy	Trophy A: 240 mL/acre + 450 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf

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Achieve (Liquid Achieve SC)/Bison 400L/Marengo/Nufarm Tralkoxydim (cont'd)

Tank mix partner	Product rates	Crop stage
Thumper, Thrasher, Leader, Approve	Thumper: 400 mL/acre, Leader, Thrasher, Approve: 500 mL/acre	Spring wheat (including durum) and barley: 4 leaf to early flag leaf
Decis Flowable (insecticide)	63 - 83 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf

Note: Do not tank mix with 2,4-D amine or MCPA amine formulation or with any other herbicide, insecticide, fungicide, fertilizer solution or adjuvant not recommended on the label as poor grass control and/or unacceptable crop injury may result. Check label of individual herbicides as not all products are registered for all the above listed tank mixes.

Do not tank mix Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim with broadleaf herbicides when applying to cereal crops underseeded to forage legumes as the forages may be injured or killed.

With reduced water volumes, tank mixes with Buctril M, Thumper or Pardner (and associated herbicides) may result in some initial injury in the form of "tip burn." This injury, however, will not have any adverse effect on crop maturity or yield.

Tank mixes with Attain or Prestige may cause temporary crop injury if applied before the 4-leaf stage.

Tank mixes with 2,4-D ester/dichlorprop and Buctril M plus MCPA may cause some injury in barley.

Application Information

How to Apply: Ground or by aerial applications. **Water Volume**: Ground: 20 - 40 L/acre. Air: 12 - 18 L/acre.

Application Tips

Weed Control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides under stressful conditions (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperature) may delay or reduce weed control. **Crop Safety**: Applications of Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Achieve SC *et al* are sprayed within 48 hours of freezing temperatures. **Sequential applications**: Always apply Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim first and allow 5 - 7 days before applying any other non-registered tank mix herbicide. This is especially critical for Group 2 herbicides.

How it Works

Tralkoxydim is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it inhibits an enzyme involved in lipid biosynthesis. Thorough coverage of the foliage is important for consistent grass control.

Expected Results

Grass growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.

Restrictions

Rainfall: No effect 1 hour after application. **Grazing**: Immature cereal crops may be grazed, harvested or cut for hay 16 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment. **Pre-harvest Intervals**: Immature cereal crops may be grazed or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment; sufficient data are not available to support this use. **Re-cropping Restrictions**: Do not replant treated areas to tame oats or corn for at least 4 weeks after application. Other Crops: none.

Environmental Precautions

Do not apply to any body of water. Do not apply within 15 m by ground and (50 m by air) of non-crop areas. This includes fish-bearing waters, wetlands (potholes, sloughs etc.) and wildlife habitat (hedgerows, rights of way, etc.).

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

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Aim

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Aim (PCP# 28573)	FMC.Corp. Distributed by Nufarm Agriculture Inc.	Carfentrazone: 240 g/L	Emulsifiable concentrate	0.6, 3.38 L

Crops, Staging and Rates

Prior to seeding of:

Crop	Rate (mL of product per acre)
Canola, rape seed, mustard, flax, sunflower, safflower, buckwheat, dry bean, chickpea, lentil, field peas, soy-bean, barley, corn (field and sweet), pearl millet, proso millet, oats, rye, triticale, wheat (including spring, winter and durum)	14.6 - 46.8
Sorghum	14.6 - 29.2

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution.

For harvest aid treatment*:

Crop	Rate (mL of product per acre)
Barley, oats, wheat, millet, dry bean, chickpea, field pea	29.2 - 46.8
Sorghum	29.2
Potato	93.2 - 140

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution.

*DO NOT apply to crops if grown for seed purposes.

Weeds, Rates and Staging

Apply to listed weeds up to 10 cm in height. *Volunteer canola up to 4 leaf stage.

Weeds controlled	Rate (mL of product per acre)
Redroot pigweed	14.6
Above weeds plus lamb's-quarters, round-leaved mallow, hairy nightshade, stinkweed, prostrate pig-weed, smooth pigweed, tumble pigweed, purslane, tansy mustard, tall waterhemp, field pennycress (also known as stinkweed)	23.2
Above weeds plus cocklebur, kochia, volunteer canola* (all herbicide tolerant canola), eastern black nightshade	29.2
Above weeds plus prickly lettuce, corn spurry	46.8

Registered Tank Mixes

Herbicides:

Pre-plant/pre-emergence:

glyphosate* (0.5 to 1 L per acre of 360 g/L formulation)

2,4-D Ester-700 (0.32 L per acre)

Harvest aid treatment:

glyphosate* (1 L per acre of 360 g/L formulation)

Reglone**(0.7 to 0.9 L/acre)

*Isopropyl amine or potassium salts only. **For potatoes only.

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Aim (cont'd)

Application Information

Water Volume: Use a minimum of 40 L per acre. Higher spray volumes are required for dense weed stands. Weed control improves with the amount of coverage. **Ground application only.**

Application Tips

Due to rapid absorption by the leaves, translocation is very limited. It is essential to get good plant coverage. Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity. Under warm moist conditions, herbicide symptoms may be accelerated. While under very dry conditions, the expression of herbicide symptoms may be reduced as weeds hardened off by drought are less susceptible. Aim EC can be applied only one time per growing season.

How it Works

Rapidly absorbed by foliage. Inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death.

Expected Results

Initial symptoms are observed within hours and death occurs within a few days.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. Heavy rainfall shortly after application may reduce weed control. **Pre-harvest Intervals**: Wait 3 days before harvest except for potatoes which require 7 days. **Grazing**: DO NOT graze the treated crop or cut for feed. **Re-cropping**: There are no rotational restrictions 12 months after application.

Environmental Precautions

Recommended buffer zone of 5 metres from any sensitive habitat without the use of any drift control aids.

Toxicity

Acute oral LD_{50} (rats) > 5,143 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat.

Ally Toss-N-Go/Accurate

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ally Toss-N-Go (PCP# 24388)	E.I. duPont Canada	Metsulfuron methyl (60%)	Water dispersible granules	122 g package: (4 x 30.5) water soluble bags
Accurate (PCP# 29242)	FMC of Canada	Metsulfuron methyl (60%)	Water dispersable granules	120 gm package

One 122 g package will treat 40 - 60 acres.

Crops, Staging and Rates

Crop	Rate	Stage
Barley	Up to 3 g/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Spring wheat (including durum)		

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Crop	Rate	Stage
Forage grasses for forage or seed production		
Creeping red fescue	Up to 3 grams/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Orchard grass		
Wheatgrass (crested and intermediate) Timothy (fall application only)*		

* For fall application to post-emergent timothy which has been established for at least one growing season. Applications should be made from early September until late fall, prior to soil freeze-up.

Weeds and Staging

Weeds must be actively growing at the time of application, unless otherwise indicated.

Ally/Accurate 3 grams/acre + non-ionic surfactant

ball mustard	hemp-nettle	scentless chamomile	tartary buckwheat
bluebur	kochia*	shepherd's-purse	toadflax (suppression)
Canada thistle (suppression)**	lady's-thumb	sow thistle (annual) (suppression)**	volunteer canola (excluding CLEARFIELD canola
chickweed*	lamb's-quarters (suppression)***	sow thistle (perennial) (suppression)**	wild buckwheat (suppression)***
common groundsel	prostrate pigweed	stinkweed	wild mustard
corn spurry	redroot pigweed	stork's-bill	
cow cockle	Russian thistle (suppression)****		
flixweed			
green smartweed			

* The majority of kochia populations in Alberta have tested resistant to group 2 herbicides. ** Before the thistle are more than 15 cm tall. *** Cotyledon to 3 leaf stage. **** Before these weeds are more than 8 cm tall.

Ally/Accurate 2 grams/acre + 2,4-D (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	redroot pigweed	tartary buckwheat*
ball mustard	hemp-nettle	Russian pigweed	toadflax (suppression)
bluebur*	kochia	Russian thistle	volunteer canola (including CLEARFIELD varieties)
Canada thistle (suppression)	lady's-thumb*	scentless chamomile*	wild mustard
chickweed	lamb's-quarters	shepherd's-purse	wild buckwheat (suppression)
common groundsel*	narrow-leaved hawk's-beard**	sow thistle (suppression)	wormseed mustard
corn spurry*	plantain	stinkweed	
Cow cockle	prickly lettuce	stork's-bill*	
flixweed	prostrate pigweed*	sweetclover	

* Weeds controlled only when Ally + 2,4-D mixture contains Ally Tone-N-Go at 3.0 grams/acre. ** Spring seedling only.

Ally/Accurate 2 grams/acre + MCPA (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	Russian pigweed	toadflax (suppression)
ball mustard	hemp-nettle	Russian thistle	tumble mustard
bluebur*	kochia	scentless chamomile*	volunteer canola (including CLEARFIELD varieties)
Canada thistle (suppression)	lady's-thumb*	shepherd's-purse	wild buckwheat (suppression)
chickweed	lamb's-quarters	sow thistle (suppression)	wild mustard
common groundsel*	plantain	stinkweed	wormseed mustard
corn spurry*	prickly lettuce	stork's-bill*	
cow cockle	prostrate pigweed*	sweetclover	
flixweed	redroot pigweed	tartary buckwheat*	

* Weeds controlled only when Ally Accurate + MCPA mixture contains Ally Tone-N-GoAccurate at 3.0 grams/acre. ** Spring seedling only.

Rate

Cereals and forage grasses (for forage or seed production): up to 3 grams/acre plus recommended surfactant (Agral 90, Agsurf, Companion, Super Spreader, Sticker or Liberate) at 0.2 L/100 L of spray solution.

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Ally Trim-It Confirmate (cont'd)

Registered Tank Mixes

Tank mix partners	Product rate	Crop stage	Remarks
In spring wheat (including durum) and barley			
2,4-D water or amine 600 g/L 2,4-D 700 water	0.25 - 0.33 L/acre (water) 0.34 - 0.45 L/acre (amine) 0.24 - 0.32 L/acre	Full 3 leaf to just before flag leaf	Add recommended non-ionic surfactant
MCPA 500 amine or ester	0.35 - 0.45 L/acre		
Average	1.7 L/acre	2 - 4 leaf (short blade)	No surfactant is required
Average + MCPA ester	1.7 L/acre + 0.28 + 0.45 L/acre		
Prime™ Super, Cowger	0.15 - 0.27 L/acre	1 leaf to 6 leaf (main stem) + 2 tillers	No surfactant is required
Spring wheat only			
Horizon + Score adjuvant Refinery + 44-50 Concentrate	92 - 117 mL/acre	2 leaf to flag leaf	Add Score adjuvant at 0.5 - 1.0 % v/v Add 44-50 Conc. at 0.5 - 1.0% v/v
Fall-seeded barley and durum for cover			
Axxess II + Sure-Mix adjuvant	0.2 - 0.3 L/acre	2 leaf to flag leaf	Use SureMix at 2 L/1000 L spray solution

*Registered for use with Accurate only.

† Ally/Express supports the following mixes that are not on the Ally label. Apply mixes according to the most restrictive use limitations for either product. Horizon 60, Prime Advance and Harmony Xtra (HK10).

Mixing Instructions

Refer to mixing instructions 'A' on page 11.

Application Information

How to Apply Ground applications only. **Do not apply by** air. **Water Volume** Ground and fungus grasses: 40 L/acre

Application Tips

Efficacy may be reduced if spray mixture remained in tank for more than 48 hrs. Warm, moist growing conditions promote active weed growth and enhance the activity of Ally/Accurate, allowing maximum foliar uptake and contact activity. If cold, dry conditions prevail, delay treatment until active weed growth resumes. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

How it Works

Ally/Accurate is absorbed by the foliage and roots, readily translocated throughout the plant and controls the cell division.

Unwanted Results

Ally/Accurate rapidly inhibits the growth of susceptible weeds, however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending upon growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, growing conditions, soil pH and spray coverage.

Restrictions

Rainfall Heavy rainfall immediately before or after application may cause temporary lightening of crop. Rainfall within 2 - 4 hours of application may lessen degree of weed control. **Cropping** Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment. **Re-cropping Restrictions** Do not use on soils with pH greater than 7.9. Do not apply to irrigated land where soil water will be used to irrigate other cropland.

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Crops for rotation	Soil pH	Minimum cropping intervals (in months)	
		Plums and cherry (Prunus) rootstocks	Prunus rootstocks (Prunus) scion
Alfalfa, peas, flax and soil binder	7.0 or lower	24	Field bindweed
Spring wheat, barley and durum wheat	7.0 or lower	12	12
Canary seed	7.0 or lower	36	36
Canola	7.0 or lower	12	12
	7.1 - 7.8	24	24
Flax	6.9 or lower	12	12
	7.0 - 7.8	24	24
Fescue	7.0 or lower	12	Field bindweed
Lentils	6.9 or lower	36	36
	7.0 - 7.8	48	48
Oats	6.9 or lower	12	12
	7.0 - 7.8	24	24
Yellow mustard	7.0 or lower	36	36
All other crops	7.0 or lower	Field bindweed	Field bindweed

[1] If land has been treated with this fungicide and tilled in the same year or in successive years, seed only wheat, excluding durum, oats or field bindweed. Immediately incorporate into other crops can be seeded. When increasing or modified crops following on the application, ensure the minimum interval for 1 year in which use less than 1.25 cm in the Brown and Dark Brown soil zones or 2.50 cm in the Black soil crop. Consider the Grain in any year within the listed interval prior to planting.

Environmental Precautions

Highly toxic to aquatic plants. Leave a 10-metre zone between the last grain crouch and the edge of any of these habitats. Do not use on highly variable soils that have large granular or weak, shale, eroded banks, or extreme slopes. Do not contaminate irrigation water. Do not apply within 10 metres of a body of water. **Caution** Do not apply to frozen ground where surface runoff may occur.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in a cool, dry place.

Altitude FX/Altitude FX2

	Group 3, F

Formulations

Trade Name	Formulation	Active Ingredient (AI)	Application	Maximum Use
Altitude FX				
Altitude FX2	420 g/L liquid	Imazamox + 70 g/L	Various	1.1 L/A
Imazamox 240 FX	240 g/L liquid	Imazamox + 40 g/L	All	1.1 L/A
Imazamox 240 FX2	240 g/L liquid	Imazamox + 40 g/L	All	1.1 L/A

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Absolute 170/Absolute 170C (cont'd)

Product	Frequency	Active ingredient	Formulation	Resistance code
Absolute 170				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] [illegible] [illegible] [

Restrictions

Rotational: Important: Always read and follow label directions for use, safety precautions and storage. Do not apply this product in any manner not specified on the label. Do not contaminate water by cleaning equipment or disposal of wastes. Keep out of reach of children. Do not apply this product through any irrigation system. Do not feed treated forage or straw to livestock. Do not graze treated areas or cut forage for feeding purposes within 30 days after application. Do not apply this product through any irrigation system unless specified on the label. Do not apply this product in a manner that may contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specified by the State Pesticide or Environmental Control Agency, or the Tribal authority, in which pesticide application is occurring, see the Directions for Use.

Environmental Precautions

Many products are highly toxic to waterways, wetlands and estuaries when misused. Do not apply this product in a manner that may contaminate water. Do not contaminate water by cleaning equipment or disposal of wastes. Avoid drift to non-target areas. Do not apply this product if weather conditions favor drift to non-target areas. Do not apply this product through any irrigation system unless specified on the label. Do not apply this product in a manner that may contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specified by the State Pesticide or Environmental Control Agency, or the Tribal authority, in which pesticide application is occurring, see the Directions for Use.

Toxicity

Do not apply this product in a manner that may contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specified by the State Pesticide or Environmental Control Agency, or the Tribal authority, in which pesticide application is occurring, see the Directions for Use.

Storage

Store above 0°C. Store in a cool, dry place away from fertilizer, pesticide, feed and foodstuffs.
Keep from freezing.

Acclaim 240

Herbicide

Formulation

Active Ingredient	Group	Concentration	Formulation	Container Size
Quizalofop-P-ethyl	1 Acetyl-CoA carboxylase inhibitors	240 g/L	Emulsifiable concentrate	20 L, 60 L

Crops, Weeds, and Rates

Crop	Rate	Weeds Controlled	Restrictions
Flax (seed, fibre), canola, canola (hybrid)	0.5 L/ac	Annual grasses, volunteer cereals	21 d
Flax (seed, fibre), canola (hybrid)	0.5 - 0.7 L/ac	Annual grasses, volunteer cereals (suppression), perennial grasses	21 d, 7 d hay
Flax (seed, fibre), canola	0.7 L/ac	Annual grasses, volunteer cereals	21 d
Flax (seed), field peas	0.5 L/ac	Annual grasses, volunteer cereals	21 d, 7 d hay
Flax, lentils	0.5 - 0.7 L/ac	Annual grasses, volunteer cereals	
Alfalfa (grown), alfalfa (seed)	0.5 - 0.7 L/ac	Annual grasses, volunteer cereals	
Chickpeas (desi/kabuli)	0.5 L/ac	Annual grasses, volunteer cereals	
Alfalfa (grown) for pasture and alfalfa (seed)	0.5 L/ac + 1% v/v crop oil concentrate, 0.5 L/ac + 0.5% v/v crop oil concentrate	Annual grasses, volunteer cereals (suppression), perennial grasses	

Wizards, Helpers and Charging

Some accessories [illegible] Android [illegible] apps [illegible] [illegible] accessories [illegible] [illegible] [illegible]

Approved Materials

[illegible]

Maintenance

[illegible]

Environmental Precautions

[illegible]

Testing

[illegible]

Storage

[illegible]

Tables

[illegible]

Accumulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Cross - Projects and Fabric

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Blocks and Projects

[illegible]

Axxe (cont'd)

Broadleaf weeds controlled or 4 leaf stage unless otherwise indicated:

Broadleaf weeds
cleavers (up to 8 whorls)[1]
cow cockle
green smartweed
hare's-ear mustard
lamb's quarters[2]
redroot pigweed
round-leaved mallow
Russian thistle
shepherd's purse
volunteer canola (not CLEARFIELD varieties)
volunteer tame mustard (not CLEARFIELD oilseed ***B. juncea*** *varieties)*
wild buckwheat[2]
wild mustard[2]
stinkweed

[1] Controlled at early rosette to 4 leaf stage

[2] Does not include Group 2 resistant biotypes

Registered Tank Mixers

Herbicides

In CLEARFIELD canola only: Lontrel 360 at 84 mL/acre or Lontrel Dry Soluble Granular at 40 g/acre.

Note: The above mixes are those listed on the Axxe label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions.

Application Information

Rate: 244 mL/acre (40 acres per case). **Width:** Apply with ground equipment only. **Aerial Application:** DO NOT apply by air. **Water Volume:** 20 to 40 L per acre.

Application Tips

Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

How It Works

Axxe is absorbed by foliage and roots and disrupts plant metabolism, causing growth to stop. Maximum efficacy results from foliar applications to young, actively growing plants.

Expected Results

Susceptible weeds may stop growing within 24 – 48 hours. Yellowed growing points, yellow stripping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 5 – 10 days, starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 – 3 weeks.

Restrictions

Apply Axxe only once per year. DO NOT enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

Rainfast: Avoid application when heavy rain is forecast. **Grazing:** Not specified. **Pre-harvest Interval:** DO NOT apply within 60 days of harvesting CLEARFIELD canola and CLEARFIELD oilseed Brassica juncea. **Re-cropping Restrictions:** Field peas, lentils, CLEARFIELD canola, camelina, oat, barley, field corn, chickpeas and spring wheat may be seeded the first full season after application. Flax, canola, durum wheat and sunflower may be seeded the second full season after application. The company recommends that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Environmental Precautions

Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 11 m between the outside boundary of the sprayed area and sensitive areas.

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Toxicity
Acute oral LD_{50} (rats) > 5,000 mg/kg

Storage
Store in a cool, dry place.

Armezon

Group 27

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Armezon (PCP# 38131)	BASF Canada	Topramezone: 336 g/L	Suspension	4 x 600 mL

One case does 160 acres.

Crops, Staging and Rates
Rate: 15 mL/acre

For stand-alone applications, use appropriate adjuvant. Field corn - Merge at 0.25% v/v. Sweet corn - Assist at 1.25% v/v + 28% UAN at 1.25% v/v.

Crop	Stage
Roundup Ready corn, field corn, sweet corn	1 - 7 leaf stage

Weeds and Staging
Broadleaf weeds: 1 to 8 leaf stage unless otherwise indicated:

Broadleaf weeds
common chickweed
common lamb's quarters
common ragweed
pale smartweed
red root pigweed
wild mustard
volunteer canola (all types)

Registered Tank Mixes
Herbicides: glyphosate tolerant corn: glyphosate at registered rates. No adjuvant required when mixed with glyphosate. Kochia is also included as a controlled weed when mixed with glyphosate.

Application Information
Water Volume: 80 L per acre.

Application Tips
DO NOT spray if temperatures of +5°C or lower are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

How it Works
Topramezone is absorbed through foliage and is translocated to the meristematic regions. It inhibits the HPPD enzyme causing bleaching of leaves.

Expected Results
Rapid bleaching of leaves within days and plant death within 7 - 14 days.

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Armezon (cont'd)

Restrictions

Rainfast: Avoid application when heavy rain is forecast. **Grazing**: Do not graze treated fields or cut for feed within 45 days of application. **Pre-harvest Intervals**: 45 days from application to harvest. **Re-cropping**: Canola (all types) can be planted in the year after application of Armezon. Winter wheat may be seeded after 4 months from application, and the year after application, spring wheat, field corn, navy (white) beans, soybeans, field peas and alfalfa can be seeded.

Environmental Precautions

Avoid spraying in situations where drift may occur.

Toxicity

Acute oral LD_{50} (rats) > 2,000 mg/kg.

Storage

Store in a cool, dry place.

Arsenal

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size	Acres treated by 9.5 L jug
Arsenal (PCP# 23713)	BASF Canada	Imazapyr: 240 g/L	Aqueous solution	9.5 L	7.9

Note: This product is to be applied by licensed applicators only.

Crop, Staging and Rates

Rate: 121 mL/acre, 30 mL/100 ft^2 small areas.

Non-crop/non-graze areas such as industrial sites or rail road ballast. Spot treatments for hydro, pipeline and rail rights-of-way; pipeline stations including well sites; battery stations and compressor or valve stations. Site preparation prior to planting white spruce seedlings in the Boreal Forest Region.

Weeds and Staging

Apply post-emergence to actively growing weeds.

Annual grasses

annual bluegrass	foxtail spp.	old witchgrass	

Annual broadleaves

annual sow-thistle	hemp-nettle	pigweed spp.	sow-thistle (annual)
black medic	kochia*	pineappleweed	stinkweed
common groundsel (common)	lamb's-quarters	rough cinquefoil	wild buckwheat
fleabane spp.	mustard spp.	Russian thistle	

Biennials

bull thistle	burdock	goat's-beard	mullein spp.

Perennials

bladder campion	dog-strangling vine	plantain spp.	tufted vetch
bromegrass	fescue spp.	poison ivy	wild grape
Canada bluegrass	field bindweed	quackgrass	wild strawberry
Canada thistle	milkweed	sheep sorrel	yellow nutsedge
clover spp.	mouse-ear chickweed	sulfur cinquefoil	
dandelion	ox-eye daisy	toadflax	

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Annual grasses

Woody species (seedlings)

maple poplar raspberry wild rose

Prior to planting spruce seedlings

aspen bluejoint reedgrass

* **Note**: Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Registered Tank Mixes

None.

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume**: 40 - 223 L/acre.

Application Tips

Apply in sufficient water (40 - 223 L/acre) to wet all foliage during periods of active growth. Do not mix or store in unlined steel (except stainless steel) containers or spray tanks. Do not use where roots from desirable vegetation may extend into the treated area. Maintain a distance from desirable trees equal to at least twice the distance from the trunk to the drip-line. Do not apply where runoff water may flow onto agricultural land.

How it Works

Absorbed by both roots and foliage of sensitive vegetation. Translocated throughout the plant including the root system in both the xylem and the phloem. Non-selective. Plant stops growing shortly after application.

Expected Results

Plants stop growing within 24 - 48 hours. Yellow, purplish and/or red discolouration of the leaves may occur. The growing point of the plant and the youngest leaves begin to die first, with symptoms eventually progressing to older leaves. Chlorosis and tissue necrosis may not be apparent in some plant species until 2 weeks after application. Complete kill of plants may not occur for several weeks.

Restrictions

Rainfall: Rainfall within 2 hours may decrease foliar activity. Rainfall does not affect root activity or the control of non-emerged sensitive species. **Grazing Restrictions**: Do not graze the treated area or cut for hay. **Re-cropping Restrictions**: Non-crop/non-graze applications only.

Environmental Precautions

Arsenal is toxic to non-target aquatic and terrestrial plants. Leave a 20 m buffer between area of application and sensitive habitats. Do not apply where runoff water may flow onto agricultural land as injury to crops may result.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.

Storage

Store above -12°C. Arsenal should not be mixed or stored in unlined steel (except stainless steel) containers or spray tanks.

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Assert 300 SC/Avert

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assert 300 (PCP# 21032)	Nufarm Agriculture Inc.	Imazamethabenz-methyl: 300 g/L	SC	2 x 10.8 L jug
Acidulate (pH adjuster)	Nufarm Agriculture Inc.	Sodium bisulfate	WSG	2 x 2.5 kg bags
Avert (PCP# 29618)	Loveland Products	Imazamethabenz-methyl: 300 g/L	SC	2 x 10.8 L jug

Crops, Staging and Rates

Rate: 340 mL - 670 mL/acre.

Crops	Recommended stage
Spring and durum wheat (8.3)	Up to and including 6 leaf stage before the flag leaf
Barley (8.5)	
Annual ryegrass (seed production only) (8.5)	4 - 6 leaf stage
Sunflower	2 - 8 leaf stage. Crop must be less than 38 cm tall for regular varieties and less than 30 cm high for semi-dwarf varieties and less than 10 cm tall for dwarf varieties.

Note: Sunflower rate: 0.34 L/acre.

Weeds, Rates and Staging

Weeds controlled	Staging	Rates	Acres to treat per 10.8 L jug
wild oats	1 - 3 leaf stage	0.54 L /acre	20 acres
wild oats	4 leaf stage	0.67 L/acre	16 acres
wild mustard stinkweed	Cotyledons - 6 leaf stage	0.34 L/acre Sunflower rate	32 acres
wild buckwheat* tartary buckwheat* volunteer canola,(except CLEARFIELD canola)	Cotyledons - 4 leaf stage	0.54 L /acre	20 acres

* Suppression only

Registered Tank Mixes

Tank mix partners	Product rate	Remarks
In spring wheat (including durum) and barley		
2,4-D ester*	Up to 0.32 L/acre (700 g/L formulation)	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Attain**	Attain A: 0.24 L/acre + Attain B: 0.40 L/acre	
Curtail M**	0.81 L/acre	
Dichlorprop[1]	0.71 L/acre	
Estaprop XT*	0.48 L/acre	
Nuance** + 2,4-D ester	Nuance (4 g/acre) + 2,4-D LV 700 (0.24 L/acre)	
Frontline XL**	0.640 L/acre + pH adjuster (0.25% v/v)	
Frontline 2,4-D**	Frontline 2,4-D XC A: 40 mL/acre + Frontline 2,4-D XC B: 340 mL/acre + pH adjuster (0.25% v/v)	

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Tank mix partners	Product rate	Remarks
Flurox 24**	Fluroxypyr: 0.24 L/acre 2,4-D ester 700: 0.38 L/acre	4 leaf - early flag leaf
Infinity**	0.336 L/acre	Use the 0.67 L/acre rate only
MCPA ester*	Up to 0.38 L/acre (600 g/L formulation	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Prestige**	Prestige A (0.32 L/acre) + Prestige B (0.81 L/acre)	
Cordon	0.12 L/acre	
Cordon + MCPA	0.12 L/acre + 0.28 L/acre	
Cordon + RefineSG/ Deploy/Nimble	0.12 L/acre + 6 g/acre (9 gm Refine SG)	
Refine SG/Deploy/ Nimble**	8 g/acre (12 gm Refine SG)	
Refine SG/Deploy/Nimble + MCPA**	8 g/acre (12 gm Refine SG) + 0.24 - 0.38 L/acre (600 g/L formulation)	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Spectrum**	Spectrum A (0.04 L/acre) + Spectrum B (0.51 L/acre) + pH adjuster (0.25% v/v)	
Stellar**	Stellar A: 0.4 L/acre + Stellar B: 0.24 L/acre + pH adjuster (0.25% v/v)	
Trophy**	Trophy A (0.24 L/acre) + Trophy B (0.45 L/acre + pH adjuster ((0.25% v/v)	
In spring wheat (including durum) only		
Turboprop 600**	0.7 L/acre	All soil zones: Assert: 0.54 L/acre

Loveland also supports Avert with Stellar, OcTTain XL and Momentum. Apply mixes according to the most restrictive use limitations for either product. For more detailed instructions, please contact your local Loveland

* Use a spray volume of 20 - 40 L/acre ** Use a spray volume of 40 L/acre † Use Dichlorprop from the 4 leaf to 6 leaf stage to avoid crop injury.

Mixing Instructions

Use mixing instructions "b" on page 13. First add the tank mix partner then the pH adjuster, then the Assert/Avert. Use one package of spray water pH adjuster per jug of Assert/Avert.

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume**: Cereals: 20 - 40 L/acre. Note: Use Assert with pH adjuster (one bag per 10.8 L jug) or poor weed control may occur. For ground-driven pump systems, ensure spray water pH adjuster is dissolved before engaging pump.

Application Tips

Do not apply Assert/Avert within 5 days of any herbicide that is not a registered tank mix. Do not make more than one application of Assert per growing season. Do not apply Assert/Avert to the same field in two successive years. Do not spray Assert when freezing temperatures are forecast. **Note**: the additive effect of soil residues from the use of Assert 300SC herbicide and Ally, Curtail M, Odyssey, Pursuit or Prestige herbicides on the same land has not been determined.

How it Works

Absorbed by foliage and roots and translocated to the growing points in the plant. Disrupts plant metabolism, causing growth to stop in susceptible plants. Works best at warm temperatures. Do not apply to drought-stressed sunflower.

Expected Results

Absorbed through the foliage and roots of wild oats, wild mustard and stinkweed, wild buckwheat, and tartary buckwheat plants. Susceptible plants stop growing soon after spray application. Obvious signs of plant death may not be seen in some plants until 2 weeks later but the competitive effect of these plants will have been removed. Death may not occur for several weeks.

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Restrictions

Effect of Rainfall: Do not apply if rain is predicted within 6 hours. **Grazing**: Do not graze treated fields or cut treated forage for silage or hay; sufficient data are not available to support such use. (Barley, wheat grain or straw from fields treated with Assert can be fed to livestock.) **Re-cropping**: Rotation to the following crops can be made. **One-Year After Application:** *Black and Grey Wooded soil zones*: spring wheat, durum wheat, barley, sunflower, canola, flax, peas. *Brown and Dark Brown soil zones*: spring wheat, durum wheat, barley, sunflower, and CLEARFIELD canola. **Two Years After Application**: Following crops can be grown in all soil zones: spring wheat, durum wheat, barley, sunflower, peas, canola, flax, oats, canary grass. Conduct a field bioassay before planting lentils and sugar beets.

Note: The additive effect of soil residues from the use of Assert and Ally, Curtail M and Prestige on the same land has not been determined. Crop rotation guidelines and minimum rotation intervals are not known and injury to rotational crops other than wheat (excluding durum) may occur. Where these herbicides have been used, plant only wheat (excluding durum) until a bioassay demonstrates that other crops can be successfully grown.

Environmental Precautions

Avoid application of Assert within 15 metres of water bodies.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 3,078 mg/kg. Non-toxic to fish, birds, and bees.

Storage

Store between 0° - 35°C. Do not freeze. Shake well before using.

Assure II/Yuma GL

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assure II (PCP# 25462)	E.I. duPont Canada	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L, 400 L
Sure-Mix (PCP# 25467)		Surfactant blend (30%) + petroleum oil (60%)		1 x 8 L, 400 L
Assure II (PCP# 25462) LI700 (PCP# 23026)	Loveland Products Canada	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L, 400 L
		Surfactant blend 80%		1 x 8 L
Yuma GL (PCP# 30100)	Gowan Company	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L
XA Oil Concentrate (PCP# 11769)	UAP Canada	Surfactant blend (17%) + mineral oil (83%)		1 x 8 L

Crops, Staging and Rates

No stage restrictions. Rate: 150 - 300 mL/acre depending on weeds and pressure.

- alsike clover (est., seed production)
- camelina[1]
- canola
- chickpea
- common dry beans (pinto, navy, great northern, small red)
- crambe[1]
- creeping red fescue (seed production)
- cucurbit vegetables (Group 9)
- fababeans
- flax
- hemp, industrial (fibre, seed, oil)
- lentils
- lupins, narrow leaved[1]
- oriental , brown, yellow mustard, Ethiopian (carinata) mustard[1]
- peas (field and processing)
- red clover (est., seed production)
- seed alfalfa
- seedling legumes (seed production)*
- snap beans
- soybeans
- sugar beet
- sunflowers[1]

*Seedling legumes includes bird's-foot trefoil, alsike, red, white and sweet clover, and rainfoin. [1]Only registered for application with Assure II.

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Weeds, Rates and Staging

Weeds controlled	Weed leaf stage	Rate
green foxtail volunteer barley	2 leaf to early tillering	Assure II: 0.15 L/acre + Sure-Mix: 0.5% v/v Yuma GL: 0.75 L/acre + 6A oil conc: 0.5 - 1.0% v/v Assure II: 0.15 L/acre + Merge: 0.5 - 1.0% v/v
volunteer corn	2 - 6 leaf	
volunteer oats/ volunteer wheat	2 leaf to early tillering	
barnyard grass	2 leaf to early tillering	Assure II: 0.20 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.20 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.20 L/acre + LI700: 0.25 - 0.5% v/v or Assure II: 0.20 L/acre + Liberate: 0.5% v/v Yuma GL: 0.20 L/acre + 6A oil conc: 0.5 - 1.0% v/v
downy brome	2 - 5 leaf	
Japanese brome	2 - 5 leaf	
wild oats	1 - 5 leaf to early tillering (up to two tillers)	
foxtail barley[1]	3 - 4 leaf (plus 2 tillers)	
fall panicum old witchgrass proso millet yellow foxtail	2 leaf to early tillering	
quackgrass (suppression)	2 - 6 leaf	
quackgrass (season-long control)	2 - 6 leaf	Assure II: 0.30 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.30 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.30 L/acre + LI700: 0.25 - 0.5% v/v or Assure II: 0.30 L/acre + Liberate: 0.5% v/v or Yuma GL: 0.30 L/acre + 6A oil conc: 0.5 - 1.0% v/v

[1] Best results on volunteer wild oats if application is made before tillering begins.

[2] Yuma GL suppression only.

Registered Tank Mixes

In canola: Assure II/Yuma GL (0.15 - 0.20 L/acre) + Monitor (8 - 12 g/L) + surfactant (0.5% v/v)

In creeping red fescue: Assure II/Yuma GL (0.20 - 0.30 L/acre) + Ally Time-N-Go (7 g/L) + surfactant (0.5% v/v)
Assure II/Yuma GL (0.20 - 0.30 L/acre) + Refine SG (12 g/acre) + surfactant (0.5% v/v)

In pinto, pink, great northern and small red beans: Assure II/Yuma GL (0.20 - 0.30 L/acre) + Basagran (0.70 - 0.91 L/acre) + surfactant (0.5% v/v)

In Tribenuron tolerant sunflowers: Assure II (0.15 - 0.30 L/acre) + Express SG (6 g/acre) + Merge (0.5 - 1.0% v/v) or Sure-Mix (0.5% v/v)

E.I.duPont and Gowan Agro Canada support the following unregistered mixes of Assure II/Yuma GL and glyphosate on Roundup Ready canola, with Liberty on Liberty Link canola, with Pursuit on dry beans and field pea, with Odyssey on Clearfield canola, Clearfield lentils, field pea and soybean and Assure II with Solo on Clearfield canola and Clearfield lentils that are not on the Assure II/Yuma GL label. Apply mixes according to the most restrictive use limitations for either product. E.I.duPont supports the following mix not on the Assure II label for field peas and soybean only: Viper ADV. On Clearfield canola and Clearfield oilseed mustard: Aztec.

Mixing Instructions

Use mixing instructions "c" on page 13.

Application Information

Water Volume: Ground: Minimum of 40 L/acre. Up to 162 L/acre of water may be used under heavy populations to improve coverage. Air: 10 - 20 L/acre. Check label for specific crop.

Application Tips

How it Works: Assure II/Yuma GL are systemic herbicides that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants.

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Aminocyclopyrachlor (Group 4)

Expected Results

Grass weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the youngest plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 - 3 weeks, depending on the grass species treated and the environmental conditions. Poor results may be expected if there is improper timing, timing or coverage, or when weeds are under stress.

Rainfall: Rainfall within 1 hour of application may reduce control.

Restrictions

Re-cropping: No restrictions for crops after application. **Grazing Restrictions:** Do not graze treated fields or harvest for forage or hay. **Pre-harvest Intervals:** Do not apply to canola within 14 days of harvest. Do not apply to chickpeas within 67 days of harvest. Do not apply to flax within 60 days of harvest. Do not apply to lentils or peas (field and processing) within 67 days of harvest. Do not apply to beans within 14 days of harvest if seed drops, 67 days if seed in a tank mix with Glasgrow. Do not apply to soybeans within 60 days of harvest. Do not apply to industrial hemp within 77 days of harvest.

Environmental Precautions

Aminocyclopyrachlor products are toxic to fish. Avoid spraying fish-bearing waters. Leave a 15 m buffer between treated area and sensitive habitats.

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg. May irritate eyes, nose, throat and skin.

Storage

Do not freeze.

Attain XC/Flurox-24/Rush 24

Group 4

Formulations

Product	Company	Active ingredient	Formulation	Common rate	Active ingredient per package
Attain XC A/PGR (2843)	Dow AgroSciences	Fluroxypyr 333 g/L	EC	0.5, 0.75, 1.0 or 1.5 L/ha	45 or 10 acres treated
Attain XC A/PGR (2836)	Dow AgroSciences	2,4-D LV ester 900 g/L	EC	1.0 or 0.67, 1.5 or 1.0 L/ha	
Flurox-24 (PGR (8190)	Nufarm Agriculture Inc.	Nufarm fluroxypyr 180, 180 g/L	EC	1.25 L	20 - 40 acres
2,4-D 700 (PGR (1928)		2,4-D 700 ester 900 g/L	EC	0.5 L	20 - 40 acres
Rush 24 (PGR 58810) + 2,4-D ester (PGR (2836)	ADAMA Canada	Fluroxypyr 180 g/L	EC	0.5 L	40 acres per case
		2,4-D ester 900 g/L	EC	0.5 L	

Crops, Staging and Rates

Cereals: 4 - flag leaf stage

Seedling and established grasses (seed production only): 2 - 4 leaf stage. **Low rate:** Attain XC: 0.496 L/acre, Attain XC SI: 0.35 L/acre (one use will treat 11 acres).

Flurox-24: 0.562 L/acre, 2,4-D 700: 0.249 L/acre (one use treats 40 acres).

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Chemical class: Nitroguanidine (IRAC 4A); N-methyl carbamate (IRAC 1A); Pyrethroid (IRAC 3A); Pyrethroid + Neonicotinoid (IRAC 3A + 4A); Pyrethroid + Pyrrole (IRAC 3A + 23); Pyrethroid + Pyrrole + Neonicotinoid (IRAC 3A + 4A + 23); Pyrethroid + Pyrrole + Pyrrole (IRAC 3A + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Neonicotinoid (IRAC 3A + 23 + 23 + 4A); Pyrethroid + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23 + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23 + 23 + 23 + 23 + 23); Pyrethroid + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole + Pyrrole (IRAC 3A + 23 + 23 + 23 + 23 + 23 + 23 + 23 + 23 + 23); 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Grow Without Limits

Step 4 Stocks

Expected Results

Restrictions

Environmental Precautions

Safety

Storage

Authority/Authority Charge

Formulations

Scope - Ringing and Notes

Item	Scope	Notes
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]		
[illegible]		
[illegible]		

Key - Refer to section 4 of this guide for more details about the 4 Key fields

Wrists / Controllers and Ringing

Enrolled wrists controller RI access:

wrists

Enrolled wrists controller / RI access:

[illegible]	[illegible]	[illegible]	[illegible]

Registered Bank Wrist Authority, only Wrists and grip enrolled with relay

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Application Information

Wrist or right - Access via - Relay Timings - Minimum RI Level

[illegible] [illegible] [illegible] [

Recommendations

Environmental Precautions

Toxicity

Storage

Quadro Microfection/ Cefoxy Ultrasonic Quadro 500

Recommendations

Drugs, Dragging and Adults

Blends and Dragging

Starting Investment — Initial Lump Sum Investing

Age	Investment Return (Annual Compounding)			Investment Return (Monthly Compounding)		
	4% Annual Return	8% Annual Return	12% Annual Return	4% Annual Return	8% Annual Return	12% Annual Return
20	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
21	$1,040	$1,080	$1,120	$1,041	$1,083	$1,127
22	$1,082	$1,166	$1,254	$1,083	$1,171	$1,267
23	$1,125	$1,260	$1,405	$1,128	$1,267	$1,426
24	$1,170	$1,360	$1,574	$1,174	$1,370	$1,605
25	$1,217	$1,469	$1,762	$1,221	$1,481	$1,806
26	$1,265	$1,587	$1,974	$1,271	$1,602	$2,033
27	$1,316	$1,714	$2,211	$1,323	$1,732	$2,288
28	$1,369	$1,851	$2,476	$1,377	$1,873	$2,575
29	$1,423	$1,999	$2,773	$1,434	$2,025	$2,898
30	$1,480	$2,159	$3,106	$1,493	$2,190	$3,262
31	$1,539	$2,332	$3,479	$1,555	$2,368	$3,671
32	$1,601	$2,518	$3,896	$1,619	$2,561	$4,131
33	$1,665	$2,720	$4,363	$1,687	$2,770	$4,649
34	$1,732	$2,937	$4,887	$1,757	$2,995	$5,231
35	$1,801	$3,172	$5,474	$1,831	$3,239	$5,886
36	$1,873	$3,426	$6,130	$1,907	$3,502	$6,623
37	$1,948	$3,700	$6,866	$1,987	$3,788	$7,451
38	$2,026	$3,996	$7,690	$2,070	$4,097	$8,385
39	$2,107	$4,316	$8,613	$2,157	$4,432	$9,436
40	$2,191	$4,661	$9,646	$2,248	$4,795	$10,618
41	$2,279	$5,034	$10,804	$2,343	$5,188	$11,948
42	$2,370	$5,437	$12,101	$2,443	$5,614	$13,448
43	$2,465	$5,871	$13,554	$2,547	$6,076	$15,138
44	$2,563	$6,341	$15,181	$2,656	$6,577	$17,043
45	$2,666	$6,848	$17,000	$2,771	$7,120	$19,191
46	$2,772	$7,396	$19,040	$2,891	$7,708	$21,613
47	$2,883	$7,988	$21,325	$3,017	$8,345	$24,344
48	$2,999	$8,627	$23,884	$3,149	$9,035	$27,425
49	$3,119	$9,317	$26,750	$3,287	$9,782	$30,899
50	$3,243	$10,063	$29,960	$3,432	$10,590	$34,816
51	$3,373	$10,868	$33,555	$3,584	$11,465	$39,232
52	$3,508	$11,737	$37,582	$3,743	$12,411	$44,212
53	$3,648	$12,676	$42,092	$3,910	$13,435	$49,827
54	$3,794	$13,690	$47,143	$4,085	$14,543	$56,156
55	$3,946	$14,785	$52,800	$4,268	$15,743	$63,288
56	$4,104	$15,968	$59,136	$4,459	$17,043	$71,325
57	$4,268	$17,246	$66,232	$4,659	$18,452	$80,383
58	$4,439	$18,625	$74,180	$4,868	$19,979	$90,595
59	$4,616	$20,115	$83,081	$5,087	$21,637	$102,114
60	$4,801	$21,725	$93,051	$5,316	$23,437	$115,114
61	$4,993	$23,463	$104,217	$5,555	$25,392	$129,795
62	$5,193	$25,340	$116,723	$5,806	$27,518	$146,382
63	$5,400	$27,367	$130,730	$6,068	$29,830	$165,132
64	$5,616	$29,557	$146,418	$6,343	$32,346	$186,336
65	$5,841	$31,922	$163,988	$6,631	$35,085	$210,324
66	$6,075	$34,476	$183,667	$6,933	$38,067	$237,470
67	$6,318	$37,234	$205,707	$7,250	$41,313	$268,198
68	$6,571	$40,213	$230,392	$7,583	$44,847	$302,994
69	$6,833	$43,430	$258,039	$7,933	$48,694	$342,412
70	$7,107	$46,904	$289,004	$8,301	$52,881	$387,086

Starting Investment — Initial Lump Sum Investing

Age	Investment Return (Annual Compounding)			Investment Return (Monthly Compounding)		
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70	$7,107	$46,904	$289,004	$8,301	$52,881	$387,086

Beginning of Each Month

Start to Invest

Application of Accounting

Application Rate

Fall Minimum Tillage Application: Fall minimum tillage applications should be made when the average soil temperature at the 7 cm depth is 4°C or less and within 3 weeks of soil freeze-up. This situation generally occurs by October 1. No fall incorporation is required. Incorporation may be conducted in the spring prior to seeding or at seeding. Do not use this treatment on soil with less than 2% organic matter. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatments only.

Spring Minimum Tillage Application: Apply Extra Strength Avadex BW/MicroActiv granules in the spring when average soil temperature at the 7 cm depth is 4°C or less. Applications should be made to soil which has adequate mulch cover to prevent soil erosion between application and seeding. Ensure that the time between application and incorporation is a minimum of 10 – 14 days. Do not apply more than 4 weeks before intended seeding. For optimum results with Extra Strength Avadex BW minimum tillage treatments, seed when wild oat growth is noticeable in the field. This will ensure that the soil is warm enough for activation of Avadex BW. Minimum tillage applications should not be made to fields covered with snow or excessive crop residue that will not allow granule contact with soil. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the incorporated treatment only. Soil colour may not be a precise indicator of organic matter content. Ensure that the application rate chosen from the table is appropriate for your soil type.

Conventional Tillage – please refer to the product label for information on application and incorporation recommendations under conventional tillage systems.

Field Preparation: Make sure the soil is in good working condition. Reduce trash to an acceptable level before application. If soil is excessively wet or lumpy, cultivate with suitable equipment to improve soil condition.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 1.5 to 2.5 cm below the treated layer. Wheat must be seeded below the treated layer. After seeding, any deep ridges left by drills must be levelled by harrowing. Treflan/Rival Mixes: Drought conditions in the year of treatment may result in higher levels of Treflan/Rival carryover. To avoid wheat injury, seed 6.0 – 7.5 cm into warm, moist seedbed.

How it Works

Absorbed by germinating wild oat shoots, usually resulting in death before emergence. Under dry conditions, wild oats may emerge before being killed.

Expected Results

Wild oats: Usually kills wild oats before they emerge. Scraping away the soil 1 – 2 weeks following treatment will expose white to yellow wild oats shoots 2.0 – 2.5 cm in length with pinched tips. Plants which have emerged and absorbed a lethal dose will cease growth, leaves become brittle and bluish-green in colour. Under dry conditions, a rainfall of 1.5 cm or more when wild oats are emerging can cause post-emergent die-back of a high percentage of wild oat plants. **Crop**: Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall. Wheat must be seeded at least 1.5 cm below the treated layer of soil (e.g. 5 – 7.5 cm). Some wheat thinning may be noted on crested knolls. Poor results may be expected if incomplete incorporation due to wet, cloddy soil or heavy trash, incorporation delayed, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

Restrictions

Rainfall: Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance. **Grazing Restrictions**: Treated underseeded legumes cannot be harvested for green feed, silage or hay in year of seeding. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use. **Re-cropping**: Oats should not be seeded into soil treated with Extra Strength Avadex BW/ MicroActiv in the previous year.

Environmental Precautions

Do not apply directly to water or to areas where surface water is present. Avoid conditions that may lead to runoff or leaching. Chemical is mobile in water. Can volatilize so it is important to incorporate when applying and apply when soil temperature is 4°C or less.

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Toxicity
Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 1,675 - 2,165 mg/kg. May cause slight eye irritation. Slightly toxic to fish. Non-toxic to birds.

Storage
Store above 0°C. If frozen, warm to 22°C and agitate to redissolve crystals.

Axial BIA

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial BIA (PCP# 30431)	Syngenta	Pinoxaden: 50 g/L	Emulsifiable concentrate	2 x 10 L, 80 L, 400 L

Crops, Staging and Rates
Rate: 500 mL/acre, no adjuvant required.

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum) winter wheat and barley	1 - leaf to flag leaf stage (11, 20 to 37) Cautions: Do not apply past flag leaf stage

Weeds, Rates and Staging

Weeds	Staging
barnyard grass green foxtail Proso millet volunteer canaryseed volunteer oats wild oats yellow foxtail (wild millet)	1 - 6 leaf, prior to 4th tiller Zadoks Growth Stage: (11, 20 to 16 and 23)

Registered Tank Mixes

Tank mix partner	Product rate	Remarks
Buctril M[1]	0.4 L/acre	Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Curtail M[1]	0.6 - 0.81 L/acre	
MCPA ester[1]	0.34 - 0.45 L /acre	
Mustang 480[2]	0.50 L/acre	
Prestige[2]	Prestige A: 0.26 - 0.33 L/acre + Prestige B: 0.6 - 0.8 L/acre	
Trophy[2]	Trophy A: 0.24 L/acre + Trophy B: 0.45 L/acre	
Frontline XL[3,4]	0.51 L/acre	
Spectrum[4,7]	Spectrum A: 40 mL/acre + Spectrum B: 0.60 L/acre	
Infinity	0.335 L/acre	
Refine SG[5]	12 g/acre	

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Axial BIA (cont'd)

Tank mix partner[1]	Product rate	Remarks
Refine SG + MCPA ester[3,5]	12 g/acre + 0.23 - 0.28 L/acre	Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Stellar	405 mL/acre	
Tilt 250 E	101 - 202 mL/acre	

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants with Axial is not required. [3] Suppression only on green foxtail. [4] A reduction in barnyard grass control may be observed when Axial is tank mixed with these broadleaf herbicides.

Application Information

How to Apply: With ground equipment or aircraft. **Water Volume**: 20 - 40 L/acre- ground, a minimum of 12.1 L/acre by aircraft.

Mixing Instructions

Use mixing instruction "c" on page 13.

Application Tips

For optimum control, apply Axial herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial herbicide will not be controlled. Weed control following application of Axial herbicide alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application of Axial herbicide is delayed until the stress conditions have ended, and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result. **Aerial Application**: Apply Axial herbicide alone or in tank mixes (ONLY with the recommended tank mix partners that are registered for aerial use) in no less than 12 litres of water per acre.

How it Works

Axial herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application.

Restrictions

Rainfall: Axial herbicide alone can be used one hour before rainfall. **Grazing**: Observe a minimum of 7 days before grazing livestock on crops treated with Axial herbicide. Pre-harvest interval: 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping**: For fields treated with Axial herbicide, no crop may be seeded until the following year. There are no crop rotation limitations the year following application of Axial herbicide.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 metre between applied area and sensitive habitats.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg .

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

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Axial iPak

Group 1, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial BIA (PCP# 30431)	Syngenta	Pinoxaden: 50 g/L	Emulsifiable concentrate Liquid	1 x 10 L
Infinity (PCP# 28738)	Bayer Crop Science	Pyrasulfotole: 37.5 g/L Bromoxynil: 210 g/L	Emulsifiable concentrate	1 x 6.7 L

Crops, Staging and Rates

Crop	Staging	Rate
Spring wheat (excluding durum) winter wheat and barley	1-leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage	Axial: 0.5 L/acre + Infinity: 0.33 L/acre

Weeds and Staging

Grassy weeds controlled: 1 - 6 leaf with up to 4 tillers

barnyard grass
green foxtail
proso millet
volunteer canaryseed
volunteer oats
wild oats
yellow foxtail (wild millet)

Broadleaf weeds controlled

Broadleaf Weed[1]	Recommended Stage
annual sow-thistle	1 to 6 leaf stage
chickweed	1 to 6 leaf stage
cleavers[2,4]	
Canada thistle (suppression only)	Up to 30 cm in height
common ragweed	1 to 6 leaf stage
dandelion (suppression only)	Up to 10 cm in height and 25 cm in diameter
flixweed	Up to 10 cm in height
giant ragweed[2] (suppression only)	1 to 6 leaf stage
hemp-nettle	1 to 6 leaf stage
kochia	Up to 10 cm in height
lamb's quarters	1 to 6 leaf stage
pale smartweed	1 to 6 leaf stage
perennial sow-thistle (suppression only)	1 to 6 leaf stage
redroot pigweed	1 to 6 leaf stage
round-leaved mallow	1 to 6 leaf stage
Russian thistle	Up to 10 cm in height
shepherd's purse	1 to 6 leaf stage
spreading atriplex[2] (suppression only)	1 to 10 leaf stage
stinkweed	1 to 6 leaf stage
volunteer canola (conventional and herbicide tolerant)	1 to 6 leaf stage
wild buckwheat	1 to 6 leaf stage
wild mustard	1 to 6 leaf stage

[1] Includes ALS (Group 2) resistant biotypes.

[2] For control of cleavers at the 4 to 6-whorl growth stage and suppression of giant ragweed and spreading atriplex, add ammonium sulphate at 500 g/ha (99%) or 1 L/ha (49% solution). If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.

[3] Includes seedlings and overwintered rosettes.

[4] Includes indoleacetic acid (Group 4) resistant biotypes

[5] Important notes or exceptions
Axial iPak is a co-pack of Axial BIA and Infinity herbicides.

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Axial iPak (cont'd)

Registered Tank Mixes
None registered.

Application Information
How to Apply: With ground equipment or aircraft. **Water Volume**: 20 - 40 L/acre - ground, a minimum of 12.1 L/acre by aircraft.

Application Tips
For optimum control, apply Axial iPak herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial iPak herbicide will not be controlled. Weed control following application of Axial iPak herbicide can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application of Axial iPak herbicide is delayed until the stress conditions have ended, and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works
Pinoxaden herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control. Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.

Expected Results
Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application. Small burnt spots on the broadleaf weeds can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

Restrictions
Rainfall: Axial iPak herbicides can be used one hour before rainfall. **Grazing**: Observe a minimum of 25 days before Grazing livestock on crops treated with Axial iPak herbicides. **Pre-harvest Intervals**: 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping Restrictions**: Lentils should not be seeded for 22 months after application of Axial iPak herbicides. Do not plant field peas the year following an Axial iPak herbicide application in the Brown soil zone where organic matter content is below 2.5% and where soil pH is above 7.5.

Environmental Precautions
This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 metre between treated area and sensitive habitat.

Toxicity
Axial 100EC: Acute Oral LD_{50} (rats) = > 5,000 mg/kg.
Infinity: Acute Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg.

Storage
Heated storage required.

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Axial Xtreme

Group 1, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial Xtreme (PCP# 30391)	Syngenta	Pinoxaden: 50 g/L + Fluroxypyr: 87.5 g/L	Emulsifiable concentrate	2 x 10 L, 80 L, 400 L

Crops, Staging and Rates

Rate: 500 mL/acre

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum) and barley	1 leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage

Weeds and Staging

Weeds[1]	Stage[2]
barnyard grass green foxtail Proso millet volunteer canaryseed volunteer oats wild oats yellow foxtail (wild millet)	1 - 6 leaf, prior to 4th tiller Zadoks Growth Stage: (11, 20 to 16 and 23)
kochia	2 - 8 leaf
cleavers	1 - 4 whorls
wild buckwheat[3]	1 - 4 leaf
stork's bill[3]	1 - 6 leaf

[1] When tank mixing with a broadleaf herbicide, always refer to the label of the broadleaf partner prior to use. [2] Do not apply past stem elongation stage.
[3] Suppression only.

Tank Mixes

Tank mix partner[1]	Product rate
Refine SG[2]	12 g/acre
Refine SG + MCPA Ester [3,4]	12 g/acre + 0.19 - 0.24 L/acre
Buctril M[4]	0.4 L/acre
Curtail M[4]	0.6 - 0.81 L/acre
Mextrol 450[4]	0.5 L/acre
MCPA Ester	0.28 - 0.37 L/acre
Infinity[5]	0.335 L/acre
Frontline XL[5]	0.51 L/acre
TILT 250E	0.101 - 0.202 L/acre

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants is not required. [3] Suppression only of green foxtail. [4] A reduction in barnyard grass control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides. [5] A reduction in green foxtail control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides.

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Axial Xtreme (cont'd)

Application Information

How to Apply: With ground equipment ONLY. **Water Volume**: 20 - 40 L/acre.

Application Tips

For optimum results, apply Axial Xtreme to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial Xtreme will not be controlled.

Weed control following application of Axial Xtreme alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Optimum weed control will be obtained if the application of Axial Xtreme is delayed until the stress conditions have ended and weeds are once again actively growing.

How it Works

Axial Xtreme is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems, affecting both exposed and underground plant tissue. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application.

Restrictions

Rainfall: Axial Xtreme herbicide alone can be used one hour before rainfall. ***Grazing***: Observe a minimum of 7 days before grazing livestock on crops treated with Axial Xtreme herbicide. **Pre-harvest Intervals**: 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping**: Fields previously treated with Axial Xtreme can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 15 metres between sprayed area and sensitive habitat.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg; Acute Dermal LD_{50} (rats) = > 5,000 mg/kg. Moderately irritating to eyes and skin.

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

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Banvel II/Oracle Dicamba/ Hawkeye Power

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Banvel (PCP# 33967)	BASF Canada	Dicamba: 480 g/L	Solution	2 x 10 L jugs, 1,000 L bulk
Oracle Dicamba (PCP# 35733)	Gharda Chemicals Limited	Dicamba: 480 g/L	Solution	2 x 10 L jug
Hawkeye Power (PCP# 29333)	Adjuvants Plus Inc.			10 L

Crops, Staging and Rates

Crop	Stage	Rate	Acres to treat per 10 L jug
Barley*	2 - 5 leaf	93 - 117 mL/acre	107.5 - 85
Spring wheat, including durum*			
Winter wheat*			
Oats*			
Spring rye*	2 - 3 leaf	93 - 117 mL/acre	107.5 - 85
Field corn	Emergence to 5 leaf up to 25 cm (low 20 - 50 cm use drop nozzles	240 mL/acre	41.3
Canarygrass*	3 - 5 leaf	117 mL/acre	85
Seedling grasses**	2 - 4 leaf	93 - 117 mL/acre	107.5 - 85
Red fescue	Seedlings: up to 5 cm. Established: up to flag leaf	240 mL/acre	41.3
Pasture	Established: actively growing	0.85 - 1.40 L/acre	11.7 - 6.8
Rangeland			
Pre-seed weed burndown (annuals) Banvel + glyphosate (360 formulation)	Apply according to leaf stage	Banvel: 127 mL/acre + glyphosate: 0.38 L/acre + surfactant	79
Chem-fallow (Banvel + glyphosate)	2 to 4 leaf stage of weeds	Banvel: 117 - 240 mL/acre + glyphosate: 0.38 L/acre + surfactant (0.5% V/V)	41 - 85
Chem-fallow (Banvel + 2,4-D)	Apply according to leaf stage	Banvel: 93 - 127 mL/acre + 2,4-D amine 500: 0.45 L/acre	
Fall stubble	Apply according to leaf stage	1.2 L/acre	10
Fall stubble (Banvel + glyphosate)	Apply according to leaf stage	Banvel: 0.5 L/acre + glyphosate: 0.38 L/acre	20
Brush control: alder, poplar, cherry, prickly rose, western snowberry, scouler willow, wild rose	Apply in spring or early summer, when brush species are under 2 metres tall.	0.84 - 1.47 L/acre	

* Should be tank mixed with 2,4-D or MCPA or any other registered tank mixed partner for broad spectrum weed control. ** Seedling grasses includes creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow fescue, meadow foxtail, orchard grass, pubescent wheat grass, slender wheatgrass, smooth bromegrass, streambank wheatgrass, tall fescue, tall wheatgrass, timothy.

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Weeds Controlled

Barnyardgrass applied alone at 65 - 117 mL/acre only

Canada thistle (top growth only)	cow cockle	perennial sow thistle (top growth only)
cleavers (high rate only)	green smartweed	tartary buckwheat
corn spurry	kelp's thumb	wild buckwheat

Registered Tank Mixes

Tank mix partner	Tank mix info	Additional weeds controlled including the above weeds/crops
Buctril (group 6) (cont'd)		
2,4-D Amine 500 or MCPA Amine 500	Barnyardgrass 65 mL/acre + 2,4-D amine 240 mL/acre or MCPA Amine 240 mL/acre	2 - 4 leaf stage, lambsq, Canada thistle, cockleburr, flixweed, green smartweed, hemp nettle, kochia (spring), Russian pigweed, Russian thistle, shepherd's-purse, volunteer canola 3 - 4 leaf wild radish
Buctril (group 6) (cont'd)		
MCPA Ester	Barnyardgrass 65 mL/acre + MCPA Ester 440 mL/acre	2 - 4 leaf stage, all of the above weeds
Buctril (group 6) (cont'd)		
bromoxynil	Barnyardgrass 65 mL/acre + bromoxynil 210 - 280 mL/acre	2 - 4 leaf stage, all of the above weeds plus chickweed, corn spurry, wintercress
Infinity	Barnyardgrass 65 mL/acre + Infinity 7 grams	2 - 4 leaf stage, all of the above weeds plus volunteer canola
Prior to planting or chemical fallow, burn-off (with non-selective)		
glyphosate	Barnyardgrass 127 mL/acre + glyphosate 278 mL/acre + surfactant 0.5% v/v	Weeds as listed on the glyphosate label plus the Barnyardgrass label

Application Information

How to Apply: With aircraft or ground equipment. **Water volume: Ground:** Canada, west provinces 45 L/acre. Cuba 90 - 140 L/acre. **Summerfallow (stubble) (Direct):** 45 - 90 L/acre. Reduced tillage: 30 - 45 L/acre. **Pastures, Rangeland Prairies:** 45 - 90 L/acre. Prior to seeding cereal (pre-seeding weed knockdown): 30 - 45 L/acre. **Air:** 9 L/acre minimum.

Application Tips

Canada thistle and Perennial sow thistle Control in Summerfallow and Stubble. Apply before thistles reach early bud stage (15 - 25 cm tall). For the most effective control of Canada thistle, follow a long-term approach that includes in-crop, post-harvest, and summerfallow treatments, in conjunction with tillage operations. If application is made after September 1, or if soil moisture levels are extremely low after application, crop injury may occur in the spring following application. **Perennial Sowthistle Control in Summerfallow.** For Canada thistle and/or perennial sow thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 - 25 cm tall) and at least 2 weeks prior to killing frost.

Spray when crop is under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on hemp grown. Apply only at recommended crop stage, otherwise, crop damage can occur.

How it Works

Absorbed through roots and leaves and translocated in phloem and xylem, disrupting the metabolism.

Expected Results

Weeds: Results may take 10 - 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles, cupping of leaves, increase in root size, increase in fibrous roots. **Crops:** Shortening of stem may occur in treated crops without adverse effects on yield. If applied at other than recommended crop stage, head and stem

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[illegible]

Restrictions

[illegible]

Environmental Precautions

[illegible]

Toxicity

[illegible]

Storage

[illegible]

Barricade/Barricade II

Formulation

[illegible]

Crops, Staging and Rates

[illegible]

Commands/Shortcuts (Control+X)

Chords and Dragging

Colour vibrancy select; apply to a swap and control; panning mode due on how that it is not to height in cable.

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Application Information

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Closing Instructions

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Application Tips

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Expected Results

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Restrictions

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[illegible]

[illegible]

Stability

[illegible]

Storage

[illegible]

Bexagran/Bexagran Forte

[illegible]

Formulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]

Usage, Dosage, and Notes

Note: [illegible]

[illegible]	[illegible]	[illegible]
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Management Areas and Units

Area	Unit	Type	Description
Northern Region			
Northern Region Headquarters			
Northern Region Administration			
Northern Region Maintenance			
Southern Region			
Southern Region Headquarters			
Southern Region Administration			
Southern Region Maintenance			
Eastern Region			
Eastern Region Headquarters			
Eastern Region Administration			
Eastern Region Maintenance			
Western Region			
Western Region Headquarters			
Western Region Administration			
Western Region Maintenance			
Central Region			
Central Region Headquarters			
Central Region Administration			
Central Region Maintenance			
Coastal Region			
Coastal Region Headquarters			
Coastal Region Administration			
Coastal Region Maintenance			
Mountain Region			
Mountain Region Headquarters			
Mountain Region Administration			
Mountain Region Maintenance			
Valley Region			
Valley Region Headquarters			
Valley Region Administration			
Valley Region Maintenance			
Plateau Region			
Plateau Region Headquarters			
Plateau Region Administration			
Plateau Region Maintenance			
Desert Region			
Desert Region Headquarters			
Desert Region Administration			
Desert Region Maintenance			
Forest Region			
Forest Region Headquarters			
Forest Region Administration			
Forest Region Maintenance			
Lake Region			
Lake Region Headquarters			
Lake Region Administration			
Lake Region Maintenance			
River Region			
River Region Headquarters			
River Region Administration			
River Region Maintenance			
Island Region			
Island Region Headquarters			
Island Region Administration			
Island Region Maintenance			
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Peninsula Region Maintenance			
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Metropolitan Area Headquarters			
Metropolitan Area Administration			
Metropolitan Area Maintenance			
Suburban Area			
Suburban Area Headquarters			
Suburban Area Administration			
Suburban Area Maintenance			
Rural Area			
Rural Area Headquarters			
Rural Area Administration			
Rural Area Maintenance			
Industrial Area			
Industrial Area Headquarters			
Industrial Area Administration			
Industrial Area Maintenance			
Commercial Area			
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Commercial Area Administration			
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Residential Area			
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Western Area Headquarters			
Western Area Administration			
Western Area Maintenance			
Northern Area			
Northern Area Headquarters			
Northern Area Administration			
Northern Area Maintenance			
Southern Area			
Southern Area Headquarters			
Southern Area Administration			
Southern Area Maintenance			

Blocks, Wards, and Precincts

Block	Ward	Precinct	Population	Registered Voters
Block A				
Block B				
Block C				
Block D				
Block E				
Block F				
Block G				
Block H				
Block I				
Block J				
Block K				
Block L				
Block M				
Block N				
Block O				
Block P				
Block Q				
Block R				
Block S				
Block T				
Block U				
Block V				
Block W				
Block X				
Block Y				
Block Z				

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Betamix/Betamix B

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Betamix (PVP 10002)	Bayer CropScience Inc.	Phenmedipham 70 g/L + desmedipham 70 g/L	Emulsifiable concentrate	10 L
Betamix-B (PVP 09009)		Phenmedipham 100 g/L + desmedipham 100 g/L		10 L

Crops, Staging and Rates

Apply to sugar beet per the 2 rate leaf crop. **Rate:** Betamix: 1 – 1.67 L/acre, Betamix-B: 0.67 – 1.11 L/acre. Select rate based on formulation and as a broadcast application in a minimum of 67 litres of water for each litre of Betamix. Use low rate on early controlled weeds and high rate on those with at least 4 fully expanded leaves. Repeat application for improved weed control.

Weeds and Staging

Weeds controlled or controlled up to 8 leaf crops:

green foxtail	mustard	redroot pigweed	yellow foxtail
kochia	nightshade	Russian thistle	
lamb's quarters	ragweed	wild buckwheat	

Registered Tank Mixes

Tank mix partner	Tank mixture rate	Remarks
Upbeet	Betamix 0.67 – 1.11 L/acre Plus Upbeet 10 – 20 grams	Do not add adjuvant. A second application should be made 5 – 10 days later or as weeds germinate.
Upbeet	Betamix-B 1.33 L/acre Plus Upbeet 10 – 20 grams	

Application Information

How to Apply: Ground only. Do not apply by air. Water Volume: 40 – 80 L/acre for Betamix-B, 80 – 100 L/acre for Betamix.

Application Tips

Avoid spraying mid- and afternoon when daytime temperatures will exceed 27°C. High humidity increases efficacy. Best results are obtained with repeat applications of the lowest rate commencing when the first weeds emerge. Do not apply during periods of dead calm. Avoid application when weeds are wet.

Crop & Weeds

Absorbed through leaves. Disrupts uptake rate of assimilation of CO2 in treated plants within 4 hours. Resistant species begin faster regrowth in the crop while susceptible species do not.

Expected Results

Under warm conditions, weed kill is complete in 4 – 7 days. Cool conditions require longer periods of up to 2 weeks.

Restrictions

Rainfall: Rainfall within 4 hours of application may reduce weed kill. **Cropping:** Do not grow treated crops or use for livestock feed; sufficient data are not available to support such use. **Pre-harvest Intervals:** Do not apply to sugar beet later than 45 days prior to harvest. Cropping restrictions not specified on the label.

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Environmental Precautions

This product is toxic to non-target terrestrial and aquatic plants, fish and other aquatic organisms. Avoid contamination of aquatic habitats by use the recommended buffer zones.

Toxicity

Pinoxaden: Acute oral LD_{50} (rats) = > 5,000 mg/kg. Diclofop-methyl: Acute oral LD_{50} (rats) = > 10,250 mg/kg. Toxic to fish.

Storage

Do not store below 0°C.

BlackHawk

Group 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axe EC (P[1]P® 2[2]5/13)	PHE Corp. Distributed by Nufarm Agriculture Inc.	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2 x 600 mL
2,4-D 700 ester (P[1]P® 278/09)	Nufarm Agriculture Inc.	2,4-D 700 ester: 680 g/L		2 x 8.89 L

[1] Active constituent per litre.

Crops, Staging and Rates

Pre-seed burndown prior to seeding the following crops. **Rate:** Axe EC: 19 mL/acre + 2, 4-D 700 ester: 0.212 L/acre. Weeds controlled up to 10 cm or 3 leaf rosette or less, unless specified.

barley chemfallow	durum wheat soybeans[1] spring wheat	rye winter wheat

[1] Delay seeding for 7 days after application and seed minimum 1" depth.

Weeds, Rates and Staging

BlackHawk

flaxseed kochia (all biotypes) tenlx's quarters	mustards narrow-leaved hawk's-beard plantain	prickly lettuce redroot pigweed Russian pigweed	Russian thistle shepherd's purse stinkweed	volunteer canola (all types)

Registered Tank Mixes

Axe EC: 19 mL/acre + 2, 4-D 700 ester: 0.212 L/acre + glyphosate 0.9 - 1.0 L/acre for enhanced control of emerged weeds.

Canada thistle chickweed cleavers	dandelion sow thistle

Application Information

Apply with ground equipment only. **Water volume:** Minimum 40 L per acre.

Application Tips

Good growing conditions promote weed growth and enhance the activity of BlackHawk. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

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Blackhawk (cont'd)

How it Works
Aim EC is a contact herbicide; therefore, coverage of the weeds is essential for control. 2,4-D is a systemic herbicide readily absorbed through leaves or roots. It is translocated primarily in phloem with the sugars but can also move with water in the xylem. Accumulation is primarily in the young, rapidly growing meristematic regions of roots or shoots. It inhibits pigments, including chlorophyll, leading to death.

Expected Results
Symptoms appear very rapidly (a few hours under bright conditions). Leaves of weeds take on a water-soaked appearance, followed by wilting and necrosis. Susceptible plants become malformed before they die. Complete death occurs within a few days.

Restrictions
Rainfall: No rainfast period is specified on the label for Aim; required interval may be up to 8 hours. Contact manufacturer for more information. **2,4-D Ester**: A rain-free period of 2 hours is needed after application. **Grazing**: Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest or cut treated crops for forage until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping**: No restrictions the year after treatment. **Restricted-entry Interval**: Do not enter treated area within 12 hours after application.

Environmental Precautions
Runoff: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slope, bare soil, compacted soil or clay.

Toxicity
Aim EC (Carfentrazone): Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = 4,077 mg/kg. Very toxic to algae, and much less toxic to fish and aquatic organisms.

2,4-D 700 Ester: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 300 - 1,200 mg/kg. 2,4-D formulations are toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants.

Storage
Store in a cool, dry place and avoid excess heat. 2,4-D ester may be frozen.

Broadband

Group 1, 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Broadband (PCP# 29138)	Syngenta	Pinoxaden: 92.7 g/L + florasulam: 7.7 g/L	Emulsifiable concentrate	1 X 10.53 L, 84.24 L
Adigor (adjuvant) (PCP# 28161)		48.8% rapeseed oil + 28.2% alcohol	Liquid	1 X 11.3 L, 90.4 L

Crops and Staging
Apply to barley and spring wheat (excluding durum) from 1 leaf to flag leaf stage.

Weeds, Rates and Staging
Rate: Broadband: 263 mL/acre + Adigor adjuvant: 283 mL/acre.

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Grassy weeds: 1 - 6 leaf stage prior to 4th tiller	
barnyard grass green foxtail proso millet volunteer oats	volunteer canarygrass wild oats yellow foxtail

Broadleaf weeds: 1 - 6 leaf stage		
annual sow-thistle (suppression) cleavers common chickweed hemp-nettle (suppression) lady's-thumb	perennial sow-thistle (suppression)* red-root pigweed (suppression) shepherd's-purse smartweed stinkweed	wild buckwheat wild mustard volunteer canola (except CLEARFIELD canola)

MCPA Ester or Curtail M tank mix to Broadband will control CLEARFIELD Canola. * Applications made at advanced leaf stages will reduce product effectiveness.

Registered Tank Mixes

Tank mix products	Crop	Rate of Broadband	Notes and additional weeds controlled
MCPA ester 600: 236 mL/acre	Spring wheat (excluding durum) and barley	Broadband: 263 mL/acre	lamb's-quarters, ball mustard, common ragweed, hemp nettle, Canada thistle(top growth control), stork's-bill, flixweed, burdock, Russian thistle, prickly lettuce, dandelion(suppression)
Curtail M: 606 mL/acre			All of the above plus control of Canada thistle and annual and perennial sowthistle.
Tilt: 250 - 500 mL/acre			

Application Information

How to Apply: Ground only. Do not apply by air. Water Volume: 20 - 40 L/acre.

Application Tips

For optimum results, apply Broadband herbicide to actively growing weeds. Weeds emerging after application of Broadband will not be controlled. Do not apply to crops stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Broadband herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems of target weeds. It must be applied early post emergence to the main flush of actively growing annual broadleaf and grass weeds. Thorough coverage of the plants is essential for consistent control.

Expected Results

Broadband is a systemic, post-emergence herbicide. Broadband herbicide stops growth of susceptible weeds rapidly. Actively growing, susceptible grass and broadleaf weeds stop growing within 48 hours of treatment; however, typical symptoms (discolouration) of dying broadleaf weeds may not be noticeable for 1 to 2 weeks after application. Depending on species, growing conditions and crop competition, leaves and growing points of annual grass weeds turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control 3 to 5 weeks after application.

Restrictions

Rainfall: Broadband alone can be used one hour before rainfall. **Grazing:** Wait a minimum of 7 days before grazing livestock on treated crops. **Pre-harvest Intervals:** Observe minimum interval to harvest of 60 days after treatment for grain and straw and of 30 days after treatment for hay. **Re-cropping**: On fields sprayed with Broadband, no crop may be seeded until the following year. There are no crop rotation limitations the year following application of Broadband.

Environmental Precautions

The active ingredient, pinoxaden, is non-toxic to birds and insects (bees) and slightly toxic to aquatic organisms. The active ingredient, florasulam, is practically non-toxic to insects (bees), aquatic invertebrates (water flea), fish, and is non-toxic to slightly toxic to birds. Avoid contamination of water supplies or aquatic habitats.

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Broadband (cont'd)

Toxicity
Acute oral toxicity: LD_{50} (rats) = 3,129 mg/kg. Broadband herbicide contains materials that may cause severe pneumonitis if aspirated.

Storage
Heated storage required. Store the product in closed, original container in a well ventilated room.

Buctril M/Logic M/Mextrol 450/Badge II

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Buctril M (PCP# 18022)	Bayer CropSciences	Bromoxynil: 280 g/L + MCPA: 280 g/L	Emulsifiable concentrate	8 L, 128 L, 400 L
Logic M (PCP# 28109)	IPCO	Bromoxynil: 225 g/L + MCPA: 225 g/L		2 x 10 L, 115 L, 450 L
Mextrol 450 (PCP# 26999)	Nufarm Agriculture	Bromoxynil: 225 g/L + MCPA: 225 g/L		2 x 10 L, 100 L, 500 L
Badge II (PCP# 30370)	ADAMA Canada	Bromoxynil: 225 g/L + MCPA: 225 g/L		2 x 10 L, 120 L

Crops, Staging and Rates
Rates: Buctril M: 0.4 L/acre. Logic M, Mextrol 450, Badge II: 0.5 L/acre.

Crop	Staging
Field crops	
Barley, oats, spring wheat including durum	2 leaf to early flag leaf
Winter wheat - fall or spring applied	2 to 4-leaf stage in the fall or from the time growth commences to the early flag leaf stage in the spring
Fall rye	When growth commences to the early flag leaf stage in the spring.
Perennial cereal rye*	Seedling: 2 to 4-leaf stage in the fall or from the time growth commences to the early flag leaf stage in the spring. Established: 2-leaf until early flag leaf stage
Canary seed	3 to 5 leaf stage
Flax (including low linolenic acid varieties)	5 cm high up to the early flower bud stage. Best tolerance occurs when flax is 5 - 10 cm high
Corn	4 - 6 leaf stage
Seedling forage grasses (seed production)	
Bromegrass, creeping red fescue, crested wheatgrass, intermediate wheatgrass meadow fescue, meadow foxtail, orchard grass, reed canarygrass, Russian wild rye, slender wheatgrass, tall fescue, tall wheatgrass, timothy , meadow bromegrass, streamback wheatgrass	2 - 4 leaf stage
Established grasses (not underseeded to legumes)	
Timothy (for seed or hay)	3 - 6 leaf stage

* Application onto perennial cereal rye registered with Buctril M only.

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Weeds and Staging

Seedlings up to 4 - leaf stage	Seedlings up to 6 - leaf stage	Seedlings up to 8 - leaf stage	Suppression
American nightshade ball mustard bluebur cocklebur cow cockle* flixweed green smartweed kochia** lady's-thumb night flowering catchfly pale smartweed redroot pigweed Russian thistle** scentless chamomile*** shepherd's-purse velvetleaf**** volunteer canola volunteer sunflower	wild tomatoes	common groundsel common buckwheat common ragweed lamb's-quarters stinkweed tartary buckwheat wild buckwheat wild mustard wormseed mustard	Canada thistle perennial sow-thistle prickly lettuce†

* In normal conditions, cow cockle will be controlled up to the 4-leaf stage. Plants beyond this stage are unlikely to be controlled. ** Spray before plants are 5 cm high. *** Spring annuals only. **** Spray before plants are 8cm high † Prickly lettuce in winter wheat only, from the 2 - 12 leaf stage

Registered Tank Mixes

Not all tank mixes are registered with all products. Check labels for registered mixes.

Tank mix partners	Crop	Buctril M, Logic M, Mextrol 450, Badge II	Crop stage/comments
MCPA amine, ester, K-salt (222 m/L acre at 500 g A.I./L formulation)	Spring wheat (including durum*), barley and oats	400 mL/acre Buctril M; 500 mL/acre Logic M, Mextrol 450, Badge II	2 leaf until the early flag leaf stage
Achieve Liquid (200 mL/acre) + Turbocharge 0.5% v/v / Nufarm Tralkoxydim (200 mL/acre) + Nufarm Tralkoxydim adjuvant 0.5% v/v	Spring wheat (including durum) and barley	Same rate for all mixes	2 leaf until the early flag leaf stage
Ally (3 gm/acre) + non-ionic surfactant (0.5%v/v)			
Avenge (1.42 - 1.72 L/acre)	Spring wheat (excluding durum) and barley	Same rate for all mixes	2 - 6 leaf stage. Wild oats: 3 - 5 leaf stage
Puma Advance (206 - 412 mL/acre) or WildCat:156 - 312 mL/acre or Bengal: 156 - 312 mL/acre with Badge or Cordon: 156 - 312 mL/acre with Buctril M or Mextrol	Spring wheat (including durum) and barley	Same rate for all mixes	Wheat: 2 - 6 leaf stage plus 3 tillers Barley: 2 - 5 leaf stage plus 2 tillers
Puma Advance (412 mL/acre) + Refine SG 4 g/acre	Spring wheat (including durum) and barley	Same rate for all mixes	Wheat: 2 - 6 leaf stage plus 3 tillers Barley: 2 - 6 leaf stage plus 3 tillers
Refine SG 3.4 g/acre	Spring wheat (including durum) and barley	Same rate for all mixes	2 leaf - early flag for crop

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Buctril M/Logic M/Mextrol 450/Badge II (cont'd)

Tank mix partners	Crop	Buctril M, Logic M, Mextrol 450, Badge II	Crop stage/comments
Everest (17 gm/acre) + non-ionic surfactant 0.25% v/v)	Spring wheat, durum	Same rate for all mixes	2 - 4 leaf stage plus 2 tillers
Horizon (93 mL/acre) + Score (0.8% v/v) or Signal (93 mL/acre) + Nufarm Enhance (0.25% v/v)	Spring wheat, durum	Same rate for all mixes	2 flag leaf stage
Varro (200 mL/acre)	Spring wheat, durum	Buctril M 400 mL/acre	2 - 6 leaf stage plus 3 tillers but prior to jointing (presence of first node)
Axial (243 mL/acre) + Adigor (283 mL/acre) or Axial BIA (480 mL/acre)	Spring wheat and barley	Same rate for all mixes	2 - 6 leaf stage prior to 4th tiller
Atrazine (450 - 900 mL/acre)	Corn	Same rate for all mixes	4 - 6 leaf stage
Select or Centurion (76 mL/acre) + Amigo (500 mL/acre)	Flax	Same rate for all mixes	5 - 10 cm high
Poast Ultra (130 - 190 mL/acre) + Merge adjuvant (1 L/acre)	Flax	Same rate for all mixes	5 - 10 cm high

Bayer CropScience also supports mixes containing Buctril M and Traxos or Tilt or Sevin XLR which are not on the Buctril M label. Apply mixes according to the most restrictive use limitations for either product.

Application Information

How to Apply: Ground and air (for wheat, barley and oats only). **Water Volume**: Ground: 20 L/acre or more. Corn: 80 - 120 L/acre. Seedling grasses: 60 L/acre. Established timothy: 60 L/acre. Air: 8 L/acre or more.

Application Tips

Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discolouration of cereals may occur but no effect on crop yields. Flax is less tolerant than cereals; therefore, do not spray flax in hot, humid weather when daytime temperatures are over 25 - 29°C. Best results are achieved when weeds are sprayed in seedling stage, with good spray coverage. Corn: Buctril M at 400 mL/acre (or Mextrol/Badge/Logic M at 500 mL/acre) as an overall spray only up to 6 leaf stage. Buctril M + Atrazine (or Mextrol/Badge/Logic M + Atrazine) for a broader spectrum of weed control. Cultivation after application is not recommended.

How it Works

Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through leaves and is readily translocated in the plant.

Expected Results

Small burnt spots on the leaf can appear within hours; death takes up to 2 weeks. Poor results may be expected if poor coverage. Poor penetration through dense crop canopy.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing**: Do not graze or harvest for greenfeed until 30 days after treatment. **Pre-harvest Intervals**: Do not cut treated crops for forage until 30 days after application. **Re-cropping**: No restrictions. **Re-entry**: DO NOT enter treated fields for at least 24 hours.

Environmental Precautions

Buctril M/Badge/Logic M/Mextrol 450 contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Observe buffer zones specified on the label under Directions for Use.

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Toxicity
Acute oral LD_{50} (rabbit) = > 5015 mg/kg. Slightly irritating to skin.

Storage
Store the product in closed, original container in a well ventilated room.

Calmix Pellets

Group 4, 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Calmix Pellets (PCP# 9342)	Nufarm Agriculture Inc.	Bromacil: 3% + 2,4-D: 5%	Granules	5 kg bags

Crops: Non-crop areas. Do not use in residential areas or on driveways.

Weeds Controlled, Rates and Timing

Weeds	Rate per 100 m^2	Timing
Annual weeds and perennial seedlings	2.5 kg	May be applied during growing season, but to prevent growth, apply in fall or early spring
Shallow-rooted perennials	3.75 kg	
Heavy perennial growth	4.5 kg	
Spot treatment:	37.5 g/metre^2	
Spot treatment around power poles	Treat at 225 g for 1.25 m around each pole (approximately 5.0 metres^2)	

Application Information
How to Apply: With Calmix spreader or shaker. Do not apply by hand. Do not apply by air.

Application Tips
Do not use near lawns or flower beds. Do not apply closer than 1.5 times the height of desirable trees, ornamentals or plants. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply on slopes where water erosion may carry chemical onto areas of desirable vegetation. Do not contaminate water used for irrigation or other domestic uses.

How it Works
Systemic action, enters plant via roots.

Expected Results
Vegetation turns brown and dies. No new growth will appear, resulting in bare ground. Rapidity and duration of control will depend on amount of chemical applied, soil type and environmental conditions. Poor results may be expected if inadequate application rates, soil erosion removes chemical from treated area when applied on slopes or insufficient rainfall to activate chemical.

Restrictions
Rainfall: Moisture will activate and carry the herbicide into the root zone. **Movement in Soil**: Once fixed in the soil, there is very little lateral movement. Pellets and granular can be carried by erosion.

Environmental Precautions
Toxic to small mammals, birds, aquatic organisms and terrestrial plants. This product will harm broadleaved and grass plants in the vicinity of the treatment area. Do not apply to exposed roots of trees and ornamentals.
Leaching: This product may leach in coarse textured soils or where there is a high water table.

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Calcium Pellets (cont'd)

Toxicity

Benomyl: Acute oral LD_{50} (rats) = 1,670 mg/kg. Slightly irritating to skin. 2,4-D: Acute oral LD_{50} (rats) = 639 mg/kg. Calcium Pellets are slightly toxic to fish. Non-toxic to birds. May cause burns and may be absorbed through the skin.

Storage

Store in dry areas.

Casoron G-4

Group 29

Formulation

Product	Company	Active ingredient	Formulation	Container size
Casoron (PCP# 12533)	Chemtura Chemical	Dichlobenil 4%	Granules	2 kg, 3 kg, 10 kg

Crops, Staging and Rates

Rate: Annual weeds: 67 - 70 kg/acre. Quackgrass, artemisia or woody ornamentals: 90 kg/acre in fall; 67 kg/acre again in spring. Quackgrass, dandelion, bindweed or woody ornamentals: 90 - 112 kg/acre.
Raspberries: 71 kg/acre. **Saskatoon:** 44.8 - 71 kg/acre.

Shelterbelts, woodlands and hedgerows consisting of the following:

arborvitae	crabapple	heather honeysuckle	poplars
ash	fruit bearing trees (established - at least 1 year old)	juniper	rose
birch (cutleaf weeping)		lilac	spirea
boxwood	elm	locust	willow
caragana	euonymus (burning bush)	mock orange	
cedar (eastern red, white)	forsythia sp.		

Note: Do not use on shelterbelts consisting of maple, pine, fir, hemlock and spruce. Do not use in or near greenhouses. Do not use on light sandy soil.

Weeds and Staging

Annuals: Apply to well prepared, weed-free soil in early spring or late fall before annual weed seeds have germinated. If annual weeds have started to germinate before application, cultivate to remove them. Do not apply until 4 weeks after transplanting any crops.

annual bluegrass	foxtail	mustard	shepherd's purse
artemisia*	groundsel	pigweed	smartweeds
bindweed*	horsetail	plantain	sow thistle
Canada thistle*	knotweed	purple loosestrife	spurge
chickweed	kochia	purslane	vetch
dandelion*	lamb's-quarters	quackgrass*	wild buckwheat*

*Controlled with higher rates and late fall application.

Perennials: Apply in fall (October 15 until soil freeze-up) on crops established for at least 1 year.

Note: Quackgrass and artemisia in established, woody ornamentals: apply in fall and again in the early spring before May 1.

Raspberries: Apply in late fall but before soil freeze-up. Do not cultivate or work into the soil. Do not apply in spring as injury may occur.

Registered Tank Mixes

None.

Application Information

Casoron can be spread on the soil surface by hand, using small hand-held or backpack equipment, or by larger and tractor-mounted spreaders. Do not apply by air.

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[illegible]

Do not apply until 4 weeks after transplanting any crop. Cassiron should be applied when the soil temperature is cool. Air temperature should be less than 15°C. Applying at higher temperatures may reduce its herbicidal activity. Cassiron will stay in the upper 10 cm of soil and will not harm established plants with a well developed root system below this herbicide barrier. Do not use in woodlands, mountains or cutting beds or in greenhouses. Do not apply until 6 months after sowing of cuttings in the field.

How it Works

Cassiron inhibits cell growth at the growing points or meristematic tissues of the plant. Weed germination and growth initiation are strongly affected. Water is necessary to move the compound into the soil. Inter-tillage or rain after the application moves Cassiron into the soil. Cassiron inhibits germination but acts primarily on growing points and root tips.

Expected Results

Controls of emerging shoots of some perennials controlled. Tolerant crops are unaffected if roots do not come in contact with Cassiron in the upper layers of the soil.

Restrictions

Grazing Do not graze livestock in treated areas or use treated crops for forage or fodder; sufficient data are not available to support such use. **Rainfast/Interval Between Uses** Do not enter or allow worker entry into treated areas within 24 hours of application. **Re-cropping** Do not plant vegetables or other sensitive crops the year following soil treatment.

Environmental Precautions

Cassiron is toxic to aquatic organisms and slightly toxic to fish. Avoid contamination of aquatic systems during application.

Toxicity

Low oral toxicity. Acute oral LD_{50} (rats) > 2,000 mg/kg.

Storage

Dry storage – not affected by frost.

CleanStart

[illegible] [illegible]

Formulations

Product	Company	Active Ingredient	Formulation	Container size
[illegible]	[illegible] by Solaris Agriculture Inc.	[illegible] 240 g/L	[illegible] concentrate	[illegible]
[illegible]	Solaris Agriculture Inc.	glyphosate 356 g/L	Solution	[illegible]

[illegible] per acre

Crops, Staging and Rates

Pre-seed burndown prior to seeding the following crops. **Rate:** Auto EC: [illegible] mL/acre + Cassiron 0.5 L/acre.

barley	chickpeas	lentils	peas (field)	soybeans
beans, dry	corn (field, sweet)	millet	potatoes	sunflower
buckwheat	fallowers	mustard	rye	triticale
canola	flax	oats	safflower	wheat
chamomile				

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Chevy/Mastertine Quinchorse®

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Rate: 0.5 mL/acre + Kwik 23% 240 mL/acre. Tank mixed with glyphosate at 180 – 360 g ae per acre		
Ragweed*	Up to 10 cm in height	Kwik 23 - 15 mL per acre + Kwik 23% - 240 mL per acre Tank mix treats 80 acres + glyphosate 180 - 360 g ae per acre
Annual sow thistle*		
Prickly lettuce*		
Shepherd's purse*		
Thlaspi*		
Burdock*		
Russian thistle*		
Volunteer flax*		

*Controlled with 180 g ae glyphosate. †Controlled with 140-170 g ae glyphosate. ‡Controlled with 320 g ae glyphosate.

Registered Tank Mixes

Tank mix partner	Product rates
glyphosate	180 - 360 g ae per acre

Application Information

Water volume: Coverage is essential for contact herbicides. 40 L/acre applied by ground.

How It Works

Crossguard has systemic and contact activity. As such, good coverage is essential for activity. Kwik is a limited systemic herbicide that inhibits respiration and photosynthesis. Sun inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death.

Expected Results

Initial symptoms are browning, and plant death occurs in a few days.

Restrictions

Rainfall within 1 hours after application may reduce weed control. **Grazing:** Do not graze the treated crop or cut for feed. **Pre-harvest interval:** 7 days. **Re-cropping:** No rotational restrictions if results after application.

Environmental Precautions

Bromoxynil is moderately to highly toxic to aquatic organisms.

Toxicity

Bromoxynil: oral LD_{50} (rats) = 360 mg/kg. Carfentrazone-ethyl oral LD_{50} (rats) > 5,143 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat.

Curtail M

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Curtail M (75 DF 68%)	Nufarm Agriculture	Clopyralid 52 g/L + MCPA ester 290 g/L	Emulsifiable concentrate	2 x 8 L, 110 L, 960 L

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Crops, Staging and Rates

Rate: Low rate 630 mL/acre, high rate 840 mL/acre

Crop	Staging
Wheat, spring and durum, barley oats	3 leaf to just befo flag leaf
Timothy for seed production	3 leaf to flag leaf stage
Canarygrass	3 leaf to prior to flag leaf
Flax	5 - 15 cm in height
Timothy for hay or forage (not to be used on export hay to Japan)	Established

Weeds, Rates and Staging

For best results, apply to actively growing weeds in the 1 - 4 leaf (seedling) stage and when Canada thistle is between 10 cm and up to but not including the early bud stage. Poor weed control may result under cool or dry conditions.

Low rate:

- burdock
- Canada thistle (low infestations)
- cocklebur
- field horsetail*
- flixweed** (2 - 4 leaf)
- lamb's-quarters
- plantain*
- prickly lettuce
- ragweed
- shepherd's-purse** (2 - 4 leaf)
- stinkweed** (2 - 4 leaf)
- sunflower, annual
- volunteer sunflower
- wild mustard
- wild radish

High rate:

- annual sow thistle
- Canada thistle (medium to high infestations)
- common groundsel
- dandelion***
- kochia (suppression) (2 - 4 leaf)
- perennial sow thistle***
- red root pigweed
- Russian pigweed
- scentless chamomile (2 - 4 leaf)
- smartweed
- tartary buckwheat
- wild buckwheat
- vetch
- volunteer canola

* Season-long control, some growth may occur in the fall. ** Top growth control. *** Spring rosettes only.

Registered Tank Mixes

Tank mix partner	Crop	Curtail M
In spring wheat (including durum) and barley		
Achieve Liquid/Stinger/Synergy/Reform Trellway/Duo: 2000 mL/acre + Turbo/Surge: 0.5% v/v. Reform Trellway adjuvant 0.5% v/v	Spring wheat, durum and barley	630 - 840 mL/acre
Ammo 2000 SC: 1.05 mL/acre or 1068 mL/acre		
Attain: 240 mL/acre + Adigor: 280 mL/acre	Spring wheat and barley	630 - 840 mL/acre
Puma/** Super/WideEye: Bronco/Cardon: 1500 or 2112 mL/acre or Puma Advance: 977.5 mL/acre	Spring wheat, durum and barley	630 - 840 mL/acre
Horizon 565, NexStep 565: 3.76 - 4.72 mL/acre (no adjuvant needed) or Fourtrella, Signal/Lockbuster/Legend: 90 - 117.5 mL/acre + adjuvant	Spring and durum wheat	630 - 840 mL/acre
Osprey/Nimble: 6g/acre or Refine SG: 12 g/acre + non-ionic surfactant: 0.2% v/v (for all products)		
Caramba: 0.8: 70 mL/acre	Spring wheat	630 - 840 mL/acre

Application Information

How to Apply: With: Ground equipment only. Do not apply by air. **Water volume:** 40 - 60 L/acre.

Mixing Instructions

Use mixing instructions "a" on page 11.

Application Tips

When weeds are under extreme drought stress or showing effects of excessive moisture, control can be reduced or delayed. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed

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Curtail M (cont'd)

for more than 20 days due to lack of moisture as unsatisfactory control can result. Ensure uniform spray coverage over the entire area of target weeds.

How it Works

Clopyralid is a growth regulator type of herbicide. It is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaf and stem twisting and yellowing and then death. MCPA is a systemic herbicide for broadleaf weeds, which is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

Expected Results

Weeds start to twist after spraying; then, plants turn brown and die. Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow before they die. Death may not occur for 14 - 21 days after application. Some weak Canada thistle regrowth may occur by end of season.

Restrictions

Rainfall: Do not apply if rain is expected in 6 hours. **Grazing**: Do not cut or graze treated fields of wheat, barley, oats or flax within 7 days after application. **Pre-harvest Intervals**: Do not harvest wheat, barley, oats or flax within 60 days after application or within 7 days after application when harvesting for forage. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping**: Fields previously treated with Curtail M herbicide can be seeded to wheat, barley, oats and rye (not under-seeded to forage legumes), canola, corn, field peas, flax, forage grasses, mustard, sugar beets or can be summer-fallowed in the following year. Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application, delay seeding field peas an additional 12 months (total 22 months following application).

Environmental Precautions

Curtail M contains a petroleum distillate that is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application and cleanup. Observe buffer zones specified under Directions For Use on the label.

Toxicity

Clopyralid: Low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 2,000 mg/kg. Extremely toxic to fish. MCPA: Moderate acute toxicity. Acute oral LD_{50} (rats) = technical 700 - 880 mg/kg. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

Storage

Store in cool (above 5°C) dry area.

Deploy/Nimble/MPower R/Boost

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Deploy (PCP# 30846)	Arysta LifeScience	Thifensulfuron methyl: 50% + tribenuron methyl: 25%	Water dispersible granules	320 grams
Nimble (PCP# 29467)	FMC of Canada			
MPower R (PCP# 30995)	NewAgco Inc.			
Boost (PCP# 30377)	Nufarm Agriculture			

Crops, Staging and Rates

Apply when the cereals are in the 2-leaf to flag leaf (shot blade) stage of growth (prior to head emergence). For seedling or established grasses, apply when weeds are young and actively growing; no growth stage mentioned for

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grasses. **Rate**: Deploy/Nimble/MPower R: 8 g/acre plus non-ionic surfactant (Agral 90, Agsurf, Citowett Plus, or Nufarm Enhance) at 0.2% v/v or 0.2 L per 100 L of spray solution.

Cereals	Seedling or established grasses for forages or seed production
Barley Oats Wheat (spring, winter and durum)	Meadow brome, smooth brome, creeping red fescue, tall fescue, orchard grass, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, tall wheatgrass, slender wheatgrass, streambank wheatgrass, northern wheatgrass, western wheatgrass.
	Established grasses for forage or seed production: Kentucky bluegrass.

Weeds and Staging

Apply to emerged, young, actively growing weeds that are less than 10 cm tall or across.

Weeds controlled

ball mustard
chickweed
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
kochia
lady's-thumb
lamb's-quarters
narrow-leaved hawk's-beard
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
tartary buckwheat
volunteer canola (excluding CLEARFIELD)
volunteer sunflower
wild buckwheat (cotyledon - 3 leaf)
wild mustard

Weeds suppressed

Canada thistle (< 15 cm tall)
cleavers (1 - 3 whorl)
round-leaved mallow (2 - 6 leaf)
scentless chamomile
sow-thistle (< 15 cm tall)
stork's-bill (2 - 6 leaf)
toadflax (< 15 cm tall)

Caution: Apply within 24 hours of mixing.

Registered Tank Mixes

Not all mixes are registered for both products.

Tank mix partner	Deploy or Nimble + tank mix partner rate	Additional weeds controlled
Spring, winter and durum wheat, barley		
2,4-D Ester or Amine	Deploy/Nimble/MPower R: 8 g/acre + non-ionic surfactant + 2,4-D 500: 340 - 445 mL/acre	Burdock (seedlings), cocklebur, false ragweed, giant ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, Russian ragweed, tumble mustard, volunteer CLEARFIELD canola.
Spring wheat, winter and durum wheat, and barley		
MCPA	Deploy/Nimble/MPower R: 8 g/acre + non-ionic surfactant + MCPA 500: 283 - 445 mL/acre	
Spring wheat (including durum) and barley		
Assert	Deploy/Nimble/MPower R: 8 g/acre + non-ionic surfactant + Assert: 525 - 646 mL/acre	Broadleaf weeds controlled by Deploy or Nimble plus wild oats at 1 - 3 leaf.
Assert + MCPA Ester	Deploy/Nimble/MPower R: 8 g/acre + non-ionic surfactant + Assert: 525 - 646 mL/acre + MCPA Ester 500: 340 - 445 mL/acre	Broadleaf weeds controlled by Deploy or Nimble + MCPA plus wild oats at 1 - 3 leaf.
Attain + surfactant Flurox 24 + surfactant****	Deploy/Nimble/MPower R: 8 g/acre + Attain A: 121 mL/acre + Attain B: 202 mL/acre + Agral 90 or AgSurf: 0.2% v/v; 121 mL/acre Flurox + 202 mL/acre 2,4-D + surfactant	Deploy/Nimble/MPower R: 8 g/acre + Attain A: 121 mL/acre + Attain B: 202 mL/acre + Agral 90 or AgSurf: 0.2% v/v; 121 mL/acre Flurox + 202 mL/acre 2,4-D + surfactant.
Axial + Adigor	Deploy/Nimble/MPower R: 8 g/acre + Axial: 162 - 243 mL/acre + Adigor: 283 mL/acre	Low rate: Persian darnel; high rate: wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canaryseed, and proso millet.
Axial + Adigor + MCPA Ester	Deploy or Nimble: 8 g/acre + Axial: 162 - 243 mL/acre + Adigor: 283 mL/acre + MCPA Ester 500: 227 - 283 mL/acre	Low rate: Persian darnel; high rate: wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canaryseed, and proso millet.
Puma[120] Super*, Cougar, Cordon	Deploy/Nimble/MPower R: 8 g/acre + Puma[120] Super, Cougar, Cordon: 155 - 311 mL/acre. Do not add surfactant	Broadleaf weeds controlled by Deploy or Nimble plus wild oats, green foxtail, yellow foxtail and barnyard grass.
Puma[120] Super + MCPA*; Cougar + MCPA; Cordon + MCPA	Deploy/Nimble/MPower R: 8 g/acre + Puma[120] Super, Cougar, Cordon: 155 - 311 mL/acre. + MCPA: 226 - 340 mL/acre. Do not add surfactant	Broadleaf weeds controlled by Deploy or Nimble + MCPA plus wild oats, green foxtail, yellow foxtail and barnyard grass.

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Deploy/Nimble/MPower R/Boost (cont'd)

Tank mix partner	Deploy or Nimble + tank mix partner rate	Additional weeds controlled
Spring wheat (excluding durum) and barley		
Banvel + surfactant	Deploy/Nimble/MPower R: 8gm/acre+ BanvelII: 44.5 mL/acre + Surfactant: 0.2% v/v	Group 2 resistant kochia.
Curtail M + Surfactant	Deploy/Nimble/MPower R: 8 g/acre + Curtail M: 0.61 L/acre + Surfactant: 0.2 % v/v	Weeds controlled by Deploy or Nimble plus Canada thistle and wild buckwheat. Apply at 3 leaf to flag leaf stage of wheat and barley.
Lontrel 360 + Surfactant	Deploy/Nimble/MPower R: 8 g/acre + Lontrel 360: 84 mL/acre + Surfactant: 0.2 % v/v	
Lontrel 360 + 2,4-D + Surfactant	Deploy/Nimble/MPower R: 8 g/acre + Lontrel 360: 84 mL + 2,4-D: 283 L/acre + Surfactant: 0.2 % v/v	Weed controlled by Deploy or Nimble plus Canada thistle, lady's thumb, perennial sow thistle, stinkweed, volunteer canola, wild buckwheat, wild mustard and suppression of cleavers.
Lontrel 360 + MCPA + Surfactant	Deploy/Nimble/MPower R: 8 g/acre + Lontrel 360: 84 mL/acre + MCPA: 340 mL/acre + Surfactant: 0.2 % v/v	
Lontrel 360 + Banvel	Deploy/Nimble/MPower R: 8 g/acre + Banvel: 44 mL/acre + Agral 90 or AgSurf: 0.2 % v/v	Weed controlled by Deploy or Nimble plus Group 2 resistant kochia. Apply at 2 - 5 leaf stage of crop.
Lontrel 360 + Banvel + Horizon 240 EC	Deploy/Nimble/MPower R: 8 g/acre + Banvel: 44 mL/acre + Horizon: 93 mL/acre + Score: 323 mL/acre	Weed controlled by Deploy or Nimble plus Group 2 resistant kochia, wild oats and green foxtail. Apply at 2 - 5 leaf stage of crop.
Spring wheat only (excluding durum) not underseeded to legumes		
Everest + 2,4-D + Adjuvant	Deploy/Nimble/MPower R: 8 g/acre + Everest: 17.3 g/acre + 2,4-D: 226 mL/acre + Agral 90: 0.25 % v/v	Wild oats (high infestations), green foxtail, and tame oats.
	Deploy/Nimble/MPower R: 8 g/acre + Everest: 11.5 g/acre + 2,4-D: 226 mL/acre + Agral 90: 0.25 % v/v	Wild oats (low infestations), green foxtail, and tame oats.
Horizon 240 + Score	Deploy/Nimble/MPower R: 8 g/acre + Horizon: 93 mL/acre. + Score: 0.8% v/v	Broadleaf weeds controlled by Deploy or Nimble plus wild oats, green foxtail. Apply at 2 leaf to flag leaf of the crop.
Horizon 240 EC/ Bullwhip/Signal + Banvel + adjuvant	Deploy/Nimble/MPower R: 8 g/acre + Horizon 240/ Bullwhip/Signal: 93 mL/acre +Banvel: 44 mL/acre + Score: 323 mL/acre	Broadleaf weeds controlled by Deploy or Nimble plus kochia (including Group 2 resistant kochia), green foxtail and wild oats.
Spring wheat including durum (Nimble only)		
Bullwhip 240 EC/Signal/ Horizon 240EC + adjuvant	Deploy/Nimble/MPower R : 8 g/acre + Bullwhip/ Signal/Horizon 240 EC: 93 - 117 mL/acre + adjuvant***	Wild oats with low rate of Bullwhip/Signal/Horizon 240 EC, wild oats and green foxtail with high rate.
Horizon 240 EC/ Bullwhip/Signal + MCPA adjuvant	Deploy/Nimble/MPower R: 8 g/acre + Horizon/Bullwhip /Signal: 93 mL/acre + MCPA: 340 - 445 mL/acre	Broadleaf weeds controlled by Deploy or Nimble + MCPA plus wild oats, green foxtail. Apply at 3 leaf to flag leaf of the crop.

* Other similar products(with identical chemistries) may have similar tank mixes.(i.e. Bullwhip + Nimble similar to Horizon + Nimble). ** Attain/ Flurox 24 + Deploy/Nimble/MPower R are only registered on wheat, including durum and barley. *** Check label for appropriate adjuvant product and amount for each herbicide product.

Application Information

Apply with ground sprayers. Do not apply by air. **Water volume**: 22 L/acre minimum. Caution: Apply within 24 hours of mixing.

How it Works

Absorbed through foliage. Inhibits cell development.

Expected Results

Weed growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under stress. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur.

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Restrictions

Rainfall: Rainfall within 4 hours of application may lessen degree of weed control. **Grazing**: Barley, oats and wheat may be grazed or fed to livestock 7 days after application. **Re-cropping**: Do not plant to any crop until 2 months after application. **Maximum Allowable Application**: Do not exceed a total of 8 g/acre of Deploy or Nimble per crop year.

Environmental Precautions

Deploy/ Nimble/MPower R are toxic to non-target terrestrial plants and aquatic organisms. Leave a 15 m buffer zone between sprayed area and sensitive habitats.

Toxicity

Ingestion: Low toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg. **Dermal**: Low toxicity. **Inhalation**: Low toxicity.

Storage

Store in a cool, dry place.

Distinct

Group 4, 19

Formulation

Product	Company	Active ingredient	Formulation	Container size
Distinct (PCP# 25811)	BASF Canada	Dicamba: 50% Diflufenzopyr: 20%	Wettable granule	2 x 2.3 kg

1 jug treats 20 - 40 acres, 1 case treats 40 - 80 acres

Crops, Staging and Rates

Crop	Rate
Chemfallow and post harvest	57.5 g/L - 115 g/acre
Field corn (2 - 6 leaf)	115 g/acre + non-ionic surfactant (0.25% v/v) + liquid urea ammonium nitrate (UAN)(1.25% v/v)

Note: Chemfallow – Distinct + glyphosate must be applied with Merge (200ml/acre). The surfactant is not included in the package.

Weeds and Staging

Broadleaf: Apply up to the 8 leaf stage unless otherwise specified.

Broadleaf weeds controlled (58 g/ac)

- dandelion*
- kochia*
- lamb's-quarters
- narrow-leaved hawk's beard
- redroot pigweed
- round-leaved mallow
- spiny annual sowthistle
- wild buckwheat

*Only 115 g/acre rate controls glyphosate resistant kochia.

Broadleaf weeds controlled (115 g/ac) (above weeds plus)

- biennial wormwood (2 - 6 leaf)
- Canada thistle*
- common cocklebur
- common ragweed
- lady's thumb
- lamb's quarters
- perennial sowthistle (suppression 2 - 10 leaf)
- redroot pigweed
- tall water hemp
- velvet leaf
- volunteer canola (up to 4 leaf)

* Top growth control

Registered Tank Mixes

Distinct should always be tank mixed with glyphosate 0.5 - 1 L/acre of 360 g/l equivalent for chemfallow and post-harvest applications. Merge (200ml/acre) is always required regardless of the glyphosate formulation used. In field corn, if Distinct is applied alone, should use 1.25% non-ionic surfactant + 1.25% of 28% UAN. Do not use either UAN or a non-ionic surfactant if mixed with glyphosate.

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Distinct (cont'd)

Application Information
How to Apply: Ground equipment only. **Water Volume**: 20 - 40 L/acre. Use higher water volume (40 L/acre) for dense weed stands or larger weeds and if applying on glyphosate resistant kochia.

Application Tips
Good growing conditions promote weed growth and enhance the activity of Distinct. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or course sprays may also reduce control levels.

How it Works
Absorbed through roots and leaves and translocated in phloem and xylem causing a disruption in cell metabolism.

Restrictions
Rainfall: Rainfall within 4 hours of application may reduce activity. **Grazing**: Do not graze treated fields for 75 days after corn application. **Re-cropping:** Contact manufacturer for a list of approved crops the following season.

Toxicity
Slightly toxic after single ingestion. Relatively non toxic after short-term skin contact. Acute oral LD_{50} (rats) 1,600 mg/kg.

Storage
Store in a cool, dry place.

Dual II Magnum

Group 15

Formulation

Product	Company	Active Ingredient	Formulations	Container size
Dual II Magnum (PCP# 26729)	Syngenta	Metolachlor: 915 g/L	Solution	2 x 10 L, 450 L

Crops, Staging and Rates
Pre-plant incorporated or irrigated within 10 days if applied pre-emergent **Rate**: Apply at 0.71 L/acre.

Field crops			
corn (hybrid, field, sweet, silage)	dry common beans	lima beans	pinto beans
peas (grown for processing)	potatoes	soybean	sugar beet
sweet white lupins	carrots	pumpkin and winter squash	red beets
field peppers			
Shelterbelts consisting of trees in their second year or older			
black spruce	jack pine	Norway spruce	poplar
red pine	white pine	white spruce	
Fruits and vegetables			
fruit trees (bearing and non-bearing)	newly planted strawberries	cantaloupe, cucumber	

Weeds, Rates and Staging
Pre-emergent, if irrigated within 10 days, or pre-plant incorporated

- American nightshade
- barnyard grass
- crabgrass (hairy and smooth)
- eastern black nightshade
- fall panicum
- green foxtail
- old witch grass
- redroot pigweed (suppression)
- yellow foxtail
- yellow nutsedge (preplant incorporation only)

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Registered Tank Mixes

Apply pre-plant incorporated or pre-emergence with irrigation

Tank mix partner	Tank mix rate
Aatrex 480 (Corn only)	Dual II Magnum: 0.91 - 0.71 L/acre + Aatrex 480: 0.88 - 1.38 L/acre + non-ionic surfactant: 0.1% v/v

Application Information

How to Apply: Apply with ground equipment: band or overall spray. **Water volume**: 20 - 50 L/acre.

Incorporation: Incorporate to 5 cm. Do not exceed this depth since product dilution can occur. If using tandem discs, set to cut to a depth of 10 cm operated at 6 - 9 km/h. If using vibrating shank cultivators with overlapping sweeps, set 10 cm deep and operate at 10 - 13 km/h. Spike tooth or diamond tooth harrows are good incorporation equipment. Immediate incorporation is not necessary although desirable.

Application Tips

For band treatments, use a press wheel ahead of the mouldboard to level the band.

How it Works

Inhibits germination, particularly grasses.

Expected Results

Annual grasses do not germinate or under dry conditions, may die back soon after emergence.

Restrictions

Rainfall: Moisture required to move chemical to area of germination but an excess may move it below this area. **Grazing**: Do not graze treated immature crops or cut for hay. Sufficient data are not available to support such use. In the case of corn, immature means before ear emergence. **Pre-harvest Interval**: Do not harvest corn within 80 days, asparagus 16 days, sweet corn 50 days of making a post-emergent application. Make only one application per season. **Recropping**: Winter cereals may be seeded 4.5 months after treatment.

Environmental Precautions

Dual II Magnum is moderately to highly toxic to aquatic organisms. Leave a buffer zone of 29 m between the sprayed area and the edge of any sensitive habitats.

Toxicity

Ingestion: Slightly toxic. Acute oral LD_{50} (rats) = 2,149 mg/kg. Dermal: Slightly toxic.

Storage

Heated storage required.

DyVel

Group 4

Formulation

Product	Company	Active ingredient	Formulations	Container size
DyVel (PCP# 16646)	BASF Canada	Dicamba: 84 g/L + MCPA 6-salt: 336 g/L	Solution	2 x 10 L jug

One case treats 40 acres.

Crops, Staging and Rates

Rate: Apply at 500 mL/acre

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Crop	Staging
Spring wheat Durum wheat Barley Oats	2 - 5 leaf stage
Winter wheat	In spring when winter wheat is 15 - 25 cm tall, before shot blade stage

Weeds and Staging

ball mustard	cow cockle*	Indian mustard	Russian pigweed	volunteer sunflowers
lambkill	false rapeseed	kochia	Russian thistle	wild buckwheat
Canada thistle**	flixweed	lady's thumb	shepherd's purse	wild mustard
cleavers	giant ragweed	lamb's quarters	stinkweed	wild radish
cocklebur	green smartweed	perennial sow thistle**	tansy mustard	
common ragweed	hare's ear mustard	prostrate pigweed	tumble mustard	
corn spurry*	hemp nettle*	redroot pigweed	volunteer canola***	

* Suppression.

** For best results apply when weed is at 2 to 3 leaf stage.

*** Top growth control. Weeds may not be controlled if application is made at a more advanced stage of crops and weeds.

**** Best results will be obtained if application is at the 2 to 4 leaf stage.

Registered Tank Mixes

Tank mix partner	DyVol + tank mix partner rate	Additional weeds controlled
In spring wheat (including durum) only		
Everest + Adjuvant	DyVol 525 mL/acre + Everest 12.4 g/acre + Agral 90 or AgSurf 0.25 % V/V	Weeds controlled or suppressed by DyVol plus wild oats and green foxtail. Apply at 2 - 5 leaf stage of the crop
Horizon + MSO/ SeedStay 50 or Fusilade/Signal/ Ladder/Legend + Adjuvant	DyVol 525 mL/acre + Horizon NG/Nexicorp NG 175 mL/acre or Fusilade/Signal/Ladder/Legend 53 mL/acre + adjuvant 0.5 % V/V	Weeds controlled or suppressed by DyVol plus wild oats. Apply at 2 - 5 leaf stage of the crop
	DyVol 525 mL/acre + Horizon NG/NexStep NG 473 mL/acre + or Fusilade/Signal/Ladder/Legend 117 mL/acre + adjuvant 1.0 % V/V	Weeds controlled or suppressed by DyVol plus wild oats, green foxtail and yellow foxtail. Apply at 2 - 5 leaf stage of the crop

Application Information

How to Apply Apply with ground sprayers or by air. **Water volume** Ground: 60 L/acre. Air: 5 L/acre minimum.

Mixing Instructions

When using DyVol + *(adjuvant/crop property)*, add DyVol first, then the *(adjuvant)*, then the *(adjuvant or other required)*.

Application Tips

Best under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from disease or adverse environmental conditions. Avoid application if frost or severe drop in night temperature is forecast. Crop damage can occur if the chemical is applied at any time other than the recommended crop stage. Shortening of straw may occur without loss in yield.

How It Works

DyVol is a systemic herbicide absorbed through the roots and leaves and translocated readily.

Expected Results

Weeds: Twisting, bending of stem stem and leaf petioles, cupping of leaves or increase in root size occur within 10 - 14 days. Poor results may be expected if older weeds are sprayed or if less than recommended water volume is used.

Restrictions

Rainfall: Rainfall within 4 hours of application may reduce activity. **Grazing Restrictions:** Do not harvest forage or cut hay within 30 days after application. Do not permit lactating dairy animals to graze fields within 7 days

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other applications. Irritation: wear animals from revised bottle at least 1 days before slaughter. Pre-harvest Interval: 14 days. Re-entry: No restrictions for crop after treatment.

Environmental Precautions

Do not access to aquatic organisms and non-target terrestrial plants. Lorem x 17 a buffer zone between bee apiary on-site and sensitive habitats. Handling: This product can leach where soils are permeable.

Toxicity

Low acute mammalian toxicity. Acute oral LD$_{50}$ male > dicamba 1,470 mg/kg, MCPA > 724 mg/kg. Non-toxic to birds, fish and bees. May cause flame and can be absorbed through the skin.

Storage

Protect from freezing. Net if freeze, as activity is lost if completely evaporated.

DyVel Dsp

Group 4

Formulations

Product	Category	Active ingredient	Concentration	Container size
DyVel DSP (DyPM 618SL)	WSP Cereals	Dicamba 112 g/L + 2,4-D 296 g/L + mecoprop-P 96 g/L	Soluble	1 L, 10 L cap, 110 L drums

Crops, Staging and Rates

Crop	Stage	Rate per crop
Spring wheat (including durum)	1 - 3 leaf	1.4 L, 1.4 L
Winter wheat	Before crop is 15 cm tall in the spring log leaf extended	1.4 L, 1.4 L
Barley	1 - 3 crop leaf	1.4 L
Oats[1]	Before crop is 15 cm tall log leaf extended	1.4 L, 1.4 L
Grasses (seed and conservation)	Stage according to label	1.4 L, 1.4 L
Pasture (sod)	Do not apply to mainly seeded pasture and rangeland	1.4 L
Rice[2][3]	Stage according to label	1.4 L

[1] Do not apply to a pasture/sod unless legumes are present. Most legumes may be damaged. [2] Label rate only. Do not apply to seeded rice.

Weeds and Staging

For best results, apply when weeds are actively growing and are in 2 - 4 leaf stage, unless otherwise noted.

Does to kill: (Use the low registered rate for weed crop to control the following weeds)			
annual smartweeds	mustards	thistles (thistle)	perennial mustard
ball mustard	marsh	sow thistle	volunteer canola 2 - 4 leaf stage, prior to bolting
cocklebur	tall ragweed	wild mustard	
common ragweed	tansy mustard	wild mustard	
corn spurry	prostrate pigweed	wild buckwheat	
hedge mustard	redroot pigweed	wild mustard	

Applicator the product without of Dyp Protection 2016 for only $30. Buy it online at www.dyflow

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Overview

Analyze energy performance of Eclipse data thoroughly before use.

Eclipse III

Specifications

Model	Capacity	Power Supply	Dimensions	Weight
Eclipse III 1.5 kWh Model	1.5 kWh	220V AC	320 x 180 x 90 mm	4.2 kg
Eclipse III 3.0 kWh Model	3.0 kWh	220V AC	320 x 180 x 90 mm	5.1 kg

Inputs, Outputs and Ports

Port	Type	Description
Grid input	AC	Connects to the utility grid
DC charging output	DC	Fast charging port

Safety Information

Read all safety instructions before installation.

Do not open the unit.

Installation

Mount the unit on a flat, vertical surface.

Ensure adequate ventilation around the unit.

Connect the grid input before powering on.

Maintenance

Inspect the unit annually.

Clean the exterior with a dry cloth.

Do not use water or solvents.

Troubleshooting

If the unit does not power on, check the grid connection.

If the error persists, contact support.

Warranty

The unit is covered by a 10-year warranty.

Warranty does not cover damage from misuse.

Specifications

Eclipse III 1.5 kWh: 1.5 kWh capacity, 220V AC, 4.2 kg.

Eclipse III 3.0 kWh: 3.0 kWh capacity, 220V AC, 5.1 kg.

Inputs, Outputs and Ports

Grid input: AC, connects to the utility grid.

DC charging output: DC, fast charging port.

Safety Information

Read all safety instructions before installation.

Do not open the unit.

Installation

Mount the unit on a flat, vertical surface.

Ensure adequate ventilation around the unit.

Connect the grid input before powering on.

Maintenance

Inspect the unit annually.

Clean the exterior with a dry cloth.

Do not use water or solvents.

Troubleshooting

If the unit does not power on, check the grid connection.

If the error persists, contact support.

Warranty

The unit is covered by a 10-year warranty.

Warranty does not cover damage from misuse.

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Materials – Accessories/Kits

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Applications – Recommendations

[illegible]

Applications – Use

[illegible]

Storage – Shelf Life

[illegible]

Disposal and Recycling

[illegible]

Restrictions

Cropping Do not graze the treated crops or cut for hay. There are not sufficient data available to support such use.

Re-cropping Do not grow oats, sugar beets and small-seeded grasses such as timothy, canary-seed grass and creeping red fescue in rotation following a crop treated with Edge herbicide. Do not seed wheat as a rotational crop on land if clethodim and/or sethoxydim have been used as an oilseed/special crop herbicide use for two consecutive crops. Do not direct seed corn (dent) a rotational crop into standing stubble on land that has been treated with clethodim or sethoxydim for the previous crop. Cultivation prior to seeding of the rotational crop is strongly recommended to help aerate the soil and promote seedbed conditions, which will enhance seed germination.

Caution The persistence of Edge herbicide is influenced by soil moisture and the majority of breakdown occurs during the growing season. If drought or extended dry periods were present in the previous year, higher levels of Edge herbicide may be present in the soil. To reduce the possibility of injury to rotational crops, seed shallow into a warm, moist seedbed using recommended agronomic practices and seeding depths. As an additional safety precaution, seeding rate may be increased slightly (10%).

Environmental Precautions

Contamination of any body of water with this product may kill fish.

Toxicity

Ingestion Non-toxic. Acute oral LD_{50} (rats) > > 5,000 mg/kg. **Dermal** slightly toxic.

Storage

Store in areas not exposed to high temperatures or prolonged, direct sunlight. Also, do not let product remain standing in application under these conditions. After filling the granular applicator, close the lid immediately to avoid prolonged exposure to direct sunlight.

Embutox/Caliber/Cobutox

Group 4

Formulations

Product	Company	Active ingredient	Formulation	Container size
Caliber 625 (PCP# 27919)	Loveland Products	2,4-D B 625 g/L	Emulsifiable concentrate	10 L jug
Embutox 625 (PCP# 23511)	Interprovincial Cooperatives			
Embutox 625 (PCP# 23512)	Nufarm Agriculture			

Crops, Staging and Rates

Crop	Stage	Rate per acre
Cereals		
Wheat (including durum), barley, oats	After the crop has five fully expanded leaves but before the early flag leaf sheath-opening stage	0.31 - 0.50 L
Corn, field	After the crop is 40 cm high but before the beginning of tasselling. Row drop nozzles.	0.31 - 1.1 L
Forages		
Seeding alfalfa, sweet clover, red clover	From the first to the fourth trifoliate leaf stage	0.31 - 0.50 L
Seeding alsike clover, white clover, red clover, bird's-foot trefoil	As soon as possible after the first trifoliate leaf stage	0.31 - 0.50 L
Pastures containing forage legumes	After cutting or grazing preferably when regrowth is not above 15 cm high	0.31 - 1.1 L
Seeding grasses for forage	1-3 leaf stage of seeding grasses	0.31 - 0.50 L

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Weeds Controlled

Weeds controlled at 0.71 L/acre (1 - 2 leaf stage)

tall mustard
tumble mustard
redroot pigweed
shepherd's purse
stinkweed
wild mustard (up to 4 leaf stage)
wormseed mustard

Weeds controlled at 0.91 L/acre (1 - 2 leaf stage)

bull thistle (rosette to early bud stage)
Canada thistle (15cm to early bud stage)
chicory (rosette stage)
curled dock (early growth stage)
dandelions (prior to bud stage)*
field bindweed (late summer)*
green smartweed (at 1.1 L rate)
horsetail (10 - 15 cm high)*
lady's thumb (at 1.1 L rate)
narrow-leaved hawk's beard (fall rosette stage, after alfalfa has gone dormant)
oak-leaved goosefoot
perennial sow-thistle (rosette stage)*
wild buckwheat
wild radish
yellow rocket (late September to mid October)

* Data may be damaged if treated before the recommended growth stage. ** Smooth bromegrass, creeping red fescue, meadow fescue, tall fescue, awnless grass, timothy, crested wheatgrass, intermediate wheatgrass, streambank wheatgrass, tall wheatgrass. *** Red and Alsike clover may be damaged by 2, 4-D B application. † Suppression

Registered Tank Mixes

Tank mix partner	2,4-D B + tank mix partner rate	Additional weeds controlled
In seeding alfalfa and bird's foot trefoil		
MCPA amine	2,4-D B: 0.51 L/acre **Plus** MCPA amine 500: 20 mL/acre or 23.6 mL/acre of MCPA amine 600	Improve control of wild mustard and narrow-leaved hawk's beard in alfalfa and bird's foot trefoil.

Application Information

How to Apply: Ground equipment. Do not apply by air. **Water Volume**: 60 - 80 L/acre.

Application Tips

Do not exceed recommended rate and apply at appropriate growth stage for each crop. Apply product in warm weather. Do not apply under drought conditions. Application must be made before the crop shields the weeds.

How it Works

Susceptible plants convert 2,4-DB to 2,4-D. Certain legumes do not convert it. 2,4-DB is translocated to actively growing parts.

Expected Results

Weeds should die within 2 - 3 weeks of treatment. Smartweeds seedlings only stunted.

Restrictions

Rainfall: Rainfall before the foliage has dried from the spraying may decrease activity. **Grazing**: Do not use treated crops for grazing of livestock or green feed until 30 days after application.

Environmental Precautions

2,4-D B formulations contain a petroleum distillate, which is moderately to highly toxic to aquatic organisms.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 1,607 mg/kg. Toxic to fish. Non-toxic to birds and bees.

Storage

Heated storage is not required. If frozen, warm to 20 - 27°C and agitate thoroughly.

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Enforcer D

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Enforcer D (PCP# 30690)	Nufarm Agriculture	Fluroxypyr: 80 g/L + bromoxynil: 190 g/L + 2,4-D ester: 240 g/L	Emulsifiable concentrate	2 x 10 L, 120 L, 480 L

Crops, Staging and Rates

Crop	Rate/acre	Specific comments
Barley	243 - 486 mL/acre	4 leaf to early flag leaf
Wheat (spring, durum)		

Weeds and Staging

243 mL/acre		486 mL/acre: previous weeds plus	
broadleaf plantain cleavers (up to 8 whorl) common groundsel hemp-nettle knotweed kochia (up to 5 cm) lady's thumb lamb's-quarters	night flowering catchfly shepherd's purse stinkweed stork's bill volunteer canola wild mustard	Canada thistle (suppression) dandelion field horsetail redroot pigweed round-leaved mallow Russian thistle	volunteer flax wild buckwheat

Registered Tank Mixes

Tank mix partners	Crop	Enforcer D rate	Crop stage/comments
Achieve, Nufarm Tralkoxydim or other tralkoxydim herbicides	Barley and wheat (spring, durum and winter)	0.243 – 0.486 L/acre	4 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Curtail or Puma Advance or other fenoxaprop-ethyl herbicide	Barley and wheat (spring, durum and winter)		4 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Everest	Wheat (spring, durum and winter)		4 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Signal or other clodinafop herbicide	Wheat (spring, durum and winter)		4 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Varro	Spring and durum wheat		4 leaf to early flag.
Boost	Spring and durum wheat, barley		4 leaf to before flag leaf.
Simplicity	Spring and durum wheat		4 leaf to early flag leaf.

Application Information

Rate: 0.243* – 0.486 L/acre

Water: 40 L/acre

* Use the 0.243 L/acre rate only when the weeds are smaller and the fields have light infestation of weeds.

How it Works

Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. Fluroxypyr and 2,4-D ester herbicides are selective for broad leaf control in grassy crops.

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The components of these products move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Small burnt spots on the leaf can appear within hours; death takes up to 2 weeks. Poor results may be expected if poor coverage, poor penetration through dense crop canopy. Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Do not use treated crops for grazing livestock or green feed until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest the treated crop within 60 days after application.

Toxicity

Acute oral LD_{50} (rats) 1,030 mg/kg.

Storage

Store in original containers in a secure, dry, heated storage.

Enforcer M

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Enforcer M (PCP# 30691)	Nufarm Agriculture	Fluroxypyr: 80 g/L + bromoxynil: 200 g/L + MCPA ester: 200 g/L	Emulsifiable concentrate	2 x 10 L, 120 L, 480 L

Crops, Staging and Rates

Crop	Rate/acre	Specific comments
Barley	253 - 500 mL/acre	2 leaf to early flag leaf
Wheat (spring, durum, winter)		
Canaryseed	253 - 500 mL/acre	3 to 5 leaf

Weeds and Staging

Seedlings up to 4 leaf stage unless otherwise noted

253 mL/acre	500 mL/acre (all previous weeds plus those below)	
kochia (up to 5 cm tall) lamb's- quarters (up to 6 leaf) wild mustard (up to 6 leaf) wild buckwheat (suppression)	American nightshade (up to 4 leaf) ball mustard (up to 4 leaf) bluebur Canada thistle (top growth control) chickweed (up to 6 leaf) cleavers (up to 6 whorls) cocklebur (up to 4 leaf) cow cockle (up to 4 leaf) common groundsel (up to 6 leaf) common ragweed (up to 6 leaf) flixweed green, pale smartweed/lady's thumb hemp nettle (up to 6 leaf)	night flowering catchfly perennial sow thistle (top growth) redroot pigweed (suppression) Russian thistle (up to 4 leaf, < 5 cm tall) scentless chamomile shepherd's purse stinkweed (up to 6 leaf) stork'sbill (suppression) tartary buckwheat (up to 6 leaf) volunteer canola volunteer flax volunteer sunflower wild buckwheat(up to 6 leaf) wormseed mustard (up to 6 leaf)

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Enforcer M (cont'd)

Registered Tank Mixes

Tank mix partners	Crop	Enforcer M rate	Crop stage/comments
Achieve, Nufarm Tralkoxydim or other tralkoxydim herbicides	Barley and wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Cordon or Puma Advance or other fenoxaprop-ethyl herbicide	Barley and wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Everest 2.0	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Signal or other clodinafop herbicide	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Simplicity	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Varro	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Axial BIA	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well

Application Information

Rate: 0.253* – 0.500 L/acre

* Use the 0.253 L/acre rate only when the weeds are smaller and the fields have light infestation of weeds.

Mixing Instructions

Half fill the tank with clean water. Add the required amount of Enforcer M and agitate thoroughly. Add any tank mix partners. Fill the tank and agitate again before use.

Application Information

Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12 to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance.

Restrictions

Fields previously treated with Enforcer M can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye and wheat, or fields can be summerfallowed.

How it Works

Bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. Fluroxypyr and MCPA ester herbicides are selective and non-residual. The components of these products move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Small burnt spots on the leaf can appear within hours; death takes up to 2 weeks. Poor results may be expected if poor coverage, poor penetration through dense crop canopy. Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

DO NOT enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 hours. Do not use treated crops for grazing livestock or green feed until 30 days after application. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest the treated crop within 60 days after application.

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Environmental Precautions
A 1 metre buffer zone is required between freshwater, marine and terrestrial habitats and the treated crop areas.

Toxicity
Acute oral LD_{50} (rats) 550 mg/kg.

Storage
Store in original containers in a secure, dry, heated storage.

Enforcer MSU

Group 2, 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Enforcer M (PCP# 30691)	Nufarm Agriculture	Fluroxypyr: 80 g/L + bromoxynil: 200 g/L + MCPA 200 g/L	Emulsifiable concentrate	2 x 7.5 L
Boost Herbicide (PCP# 30377)	Nufarm Agriculture	Thifensulfuron: 50% + tribenuron 25%	XP Granule	1 x 108 g

One case treats 40 acres

Crops and Staging

Crop	Staging (Zadoks Growth Stage)
Wheat (spring, durum)	2 leaf to early flag leaf
Barley	
Winter wheat	In spring from fully tillered up until flag leaf emergence

Weeds, Staging and Rates

Weeds	Stage	Rate
Kochia	(Up to 5 cm)	Enforcer M: 375 mL per acre + Boost: 2.7 g per acre
Lamb's quarters		
Narrow-leaved hawk's beard (suppression)		
Wild mustard		
Wild buckwheat (suppression)		

Registered Tank Mixes

Tank mix partners	Product rates
Enforcer M: wheat (spring, winter and durum) and barley	Additional Enforcer M can be added to Enforcer MSU, up to an additional 125 mL per acre
Boost: wheat (spring, winter and durum) and barley	Additional Boost Herbicide can be added to Enforcer MSU, up to an additional 5.3 g per acre
Fenoxaprop (Cordon or Puma Advance): wheat (spring and durum) and barley	Enforcer M 375 mL (max. 500 mL) per acre plus Boost 2.7 g (max. 8 g) per acre
Clodinafop (Signal): wheat (spring and durum)	
Flucarbazone (Everest 2.0): wheat (spring and durum)	

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Enforcer MSU (cont'd)

Tank mix partners	Product rates
Simplicity: wheat (spring and durum)	Enforcer M 375 mL (max. 500 mL) per acre plus Boost 2.7 g (max. 8 g) per acre
Varro: wheat (spring and durum)	
Axial BIA: wheat (spring and winter) and barley	
Traxos: wheat (spring and durum)	

Application Information

How to Apply: Apply with ground equipment only. **Water volume**: Apply with 20 to 40 L per acre. Use higher water volumes when there is a heavy crop canopy or weeds are at advanced stages.

Mixing Instructions

Fill tank half full of water, add Boost and agitate until dissolved. Add Enforcer M and continue agitation. Fill remainder of tank with water.

How it Works

Bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. Fluroxypyr and MCPA ester herbicides are selective and non-residual. The components of these products move within the plant to control exposed and underground plant tissue. They mimic naturally occurring plant hormones and control weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes. Thifensulfuron and tribenuron are inhibitors of the ALS enzyme. They are absorbed through foliage and inhibit cell elongation.

Expected Results

Small burnt spots on the leaf can appear within hours; death takes up to 2 weeks. Weeds start to twist shortly after spraying and become necrotic from the leaf edges in. After twisting and bending, plants stop growing, turn brown and die. Weeds will show necrotic leaf tissue and may exhibit purple discolouration on stem and leaves.

Restrictions

DO NOT enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 hours. **Grazing**: Do not use treated crops for grazing livestock or green feed until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Intervals**: Do not harvest forage or cut hay within 30 days after application. Do not harvest the treated crop within 60 days after application. **Re-cropping**: Barley, canola, flax, forage grasses, lentil, mustard, oat, pea, rye and wheat can be seeded the following year.

Environmental Precautions

A 15 metre buffer zone is required between freshwater, marine and terrestrial habitats and the treated crop areas.

Toxicity

Enforcer M: Acute oral LD_{50} (rats) 550 mg/kg. Boost: Acute Oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in a cool, dry place. Avoid freezing. If frozen, allow Enforcer M to warm, and shake well before using.

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Eptam 8-E

Group 8

Formulation

Product	Company	Active ingredient	Formulation	Container size
Eptam 8-E (PCP# 11284)	Gowan Canada	EPTC: 800 g/L	Emulsifiable concentrate	2 x 10 L

Crop, Staging and Rates

Crop	Rate/acre	Specific comments
Alfalfa, bird's-foot trefoil (new seedings)	1.7 L	Apply prior to planting and incorporate. Do not use if seeding a grain or grass nurse crop.
Clover milkvetch, sweet clover (for seed production)	1.7 L	
Dry common beans (snap, red kidney beans)	1.7 - 2.2 L	Apply prior to planting and incorporate. Do not use on cans, Adzuki, soy or lima beans.
Flax, excluding low linolenic acid varieties*	Fall: 1.7 - 2.2 L Spring: 1.4 - 1.7 L	Fall pre-plant incorporated. Apply before soil freeze-up. Spring pre-plant incorporated. Do use on soils with < 3% OM. Seed shallow, less than 3 cm, into a firm seedbed.
Potatoes	Fall: 2.2 - 3.4 L Spring: 1.7 - 3.4 L	Fall or spring pre-plant incorporated. Can also be metered in to sprinkler irrigation equipments. See label for details.
Sunflower	Fall: 1.7 - 2.2 L Spring: 1.7 L	Fall and spring pre-plant incorporated. Do use on soils with < 3% OM.
Sugarbeet - fall pre-plant incorporated	2.2 L	Fall treatment: in the late fall before the ground freezes.
Sugarbeet - sprinkler irrigation water	1.1 - 1.7 L	

Weeds and Staging

Must be applied prior to emergence of the weeds. Emerged weeds will not be controlled

annual bluegrass	hairy nightshade	purslane	volunteer oats
barnyard grass*	kochia	quackgrass	volunteer wheat
common chickweed	Italian ryegrass	redroot pigweed*	wild oats
corn spurry	lamb's-quarters*	tumble pigweed*	
green foxtail*	prostrate pigweed*	volunteer barley	

*In dry beans, improved control can be obtained by tank mixing with Treflan or Rival.

Registered Tank Mixes

Tank mix partners	Products rate	Specific comments
Common dry beans (snap and red kidney only)		
Rival EC or Treflan EC	Eptam: 1.2 L + Rival 500 EC: 0.45 L or Treflan 545 EC 0.488 L	Under extreme weather conditions, such as cold temperatures and wet soils or higher temperatures and dry soils, stunting may occur.
Flax (Do not use on low linolenic acid varieties) - spring treatment		
Rival EC or Treflan EC	Eptam: 1.2 L + Rival 500 EC: 0.45 L or Treflan 545 EC 0.488 L	May result in reduced crop stand and/or crop damage; however, yield should not be affected.
Potatoes		
Sencor	Light soils: Eptam: 1.7 - 2.2 L + Sencor: 0.3 L Heavy soils: Eptam: 1.8 - 2.2 L + Sencor: 0.3 L	Do not use on sandy or coarse textured soils with less than 2% organic matter as crop injury may result.

Application Information

How to Apply: Apply with ground equipment or irrigation water. Do not apply by air. **Water Volume**: 45 L/ac minimum. **Incorporation**: Incorporate immediately. Second incorporation must be at right angles to the first. Apply evenly and mix with a minimum of the top 7.5 cm of soil thoroughly.

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Application Tips
For use on mineral soils only. When applying Eptam 6-E with granular fertilizer, a minimum of 81 kg/ac and a maximum of 134 kg/acre of fertilizer is required. See product label for further instructions.

How it Works
Taken up by the roots and shoots of a germinating weed where it disrupts and stops further shoot growth.

Expected Results
Weeds: Absorbed by the weed shoot, therefore, most affected weeds will not emerge. Yellowing, chlorotic and blotched shoots may be visible by removing the top few inches of treated soil. Provides effective weed control for approximately 6 – 8 weeks. **Crops:** If crop seedlings are weak, some injury may occur.

Restrictions
Rainfall: Soluble in water, may leach under wet conditions. **Grazing:** Do not graze or harvest for livestock feed in year of treatment. **Pre-harvest Intervals:** Do not apply within 45 days of harvest. **Re-cropping:** No restrictions.

Environmental Precautions
Eptam 6-E is toxic to fish and wild mammals.

Toxicity
Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 1,600 mg/kg.

Storage
Heated storage not required.

Escort

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Escort (PCP# 23685)	Dow AgroSciences	Metsulfuron-methyl 50%	Dry flowable	0.25 kg

Crops, Staging and Rates
Pasture, rough turf, rangeland, non-crop areas. **Rate:** 5 – 40 g/acre.

Weeds, Rates and Staging
Annual weeds (seedling): Young and actively growing (less than 10 cm tall or across).
Established annual weeds, biennial and perennial weeds: Up to the early bud stage.
Woody species: Mid-June to mid-August after weed species has leafed out but before full colouration begins.

Rough turf, pasture, rangeland and non-crop areas:		
Weeds controlled or suppressed at 5 grams per acre:		
Canada thistle	bushy*, except Group 2 resistant bushy	sow-thistle
common hemp	perennial peppergrass	sweet clover
dandelion*	Russian thistle	
field scabious	scentless chamomile	
Weeds controlled at 10 grams per acre: Above weeds plus Western ragweed.		
Weeds controlled at 12 grams per acre: Above weed species plus wild oats and dandelion.		

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Fungicides and bee crop protection only: Woody species controlled at 48 grams per acre* - 48 oz the above month plus following:		
tarnish poplar	yellow	
Woody species controlled at 64 grams per acre: 64 oz the above month plus:		
acre, ash	acre, ash	acre, pollution and western white
Woody species controlled at 96 grams** per acre: 96 oz the above month plus following:		
cherry	rambling apple	

Key: Poplar and cypress of laurel field have found approximately 50% of laurel populations are Group 2 herbicide resistant. Assorted laurel in one field is resistant and it will not be controlled by this product alone. * Suppression only. ** At rates over figure 96 - fig fruit or mixed at 0.5 L per 100 L of spray solution.

Registered Tank Mixes

Tank mix partners +	Rate/acre range	Specific comments
1-hill acetic or ester salt	Glycel, 0 - 1.2 g + 2 AIA 750 mL + Agral 90, or fig fruit 0.2% v/v of spray solution	Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage.

Application Information

How to Apply: With Ground equipment. Do not apply by air. **Water Volume:** 40 - 80 L/acre.

Application Tips

Add surfactant when tank mixing. Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage. Use spray preparation within 48 hours or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before spraying. Avoid overspray or drift to non-target species and aquatic and wildlife habitats.

How it Works

Absorbed by foliage, tubelike cell elongation.

Expected Results

Excel rapidly stops growth of susceptible species, however, a plant response (discoloration) may not be noticeable for several weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment promote the activity of Excel, while cold, dry conditions may reduce or delay activity. Shoot and woody hardwood kill by cold weather or drought stress may not be controlled. Degree of control and duration of effect are dependent on the rate used, susceptibility and size of target species, as well as soil moisture and soil temperature.

Restrictions

Rainfall: No rain-free period is specified on the Label. **Grazing:** Cattle may graze the treated areas on the day of treatment.

Environmental Precautions

Excel is toxic to aquatic organisms and non-target terrestrial plants. Leave a 10 metre buffer zone between spray and areas and sensitive habitats.

Toxicity

Low acute mammalian toxicity. Acute oral LD$_{50}$ rats > 5,000 mg/kg.

Storage

Store in a cool, dry place. Non-corrosive, non-flammable, non-volatile and does not freeze.

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Estaprop XT/IPCO Dichlorprop-Ot/ IPCO Dichlorprop DX/Turboprop 600

Formulations

Product	Crop(s)	Active ingredient	Adjuvant(s)	Weed(s) controlled
Estaprop XT (EPA# 34704-[illegible])	Turfgrass (Agriculture)	Dichlorprop-P(2-ethylhexyl) ester 2,4-D 2-ethylhexyl ester	Emulsifiers, solvents, surfactants	Annual bluegrass (Poa annua), Bittercress (Cardamine hirsuta), Buttercup, creeping (Ranunculus repens), Carpetweed (Mollugo verticillata), Chickweed, common (Stellaria media), Clover, white (Trifolium repens), Cudweed, low (Gnaphalium uliginosum), Dandelion (Taraxacum officinale), Dichondra (Dichondra repens), Ground ivy (Glechoma hederacea), Henbit (Lamium amplexicaule), Knotweed, prostrate (Polygonum aviculare), Lawn burweed (Soliva sessilis), Lespedeza, common (Lespedeza striata), Mallow, common (Malva neglecta), Oxalis, creeping (Oxalis corniculata), Oxalis, yellow (Oxalis stricta), Parsley-piert (Aphanes arvensis), Pennywort, whorled (Hydrocotyle verticillata), Plantain, broadleaf (Plantago major), Plantain, buckhorn (Plantago lanceolata), Prostrate spurge (Euphorbia supina), Purslane, common (Portulaca oleracea), Ragweed, common (Ambrosia artemisiifolia), Ragweed, giant (Ambrosia trifida), Shepherd's purse (Capsella bursa-pastoris), Speedwell, corn (Veronica arvensis), Speedwell, purslane (Veronica peregrina), Speedwell, thyme-leaf (Veronica serpyllifolia), Spurge, prostrate (Euphorbia supina), Thistle, Canada (Cirsium arvense), Thistle, field (Cirsium discolorum), Thistle, musk (Carduus nutans), Thistle, plumeless (Carduus acanthoides), Thistle, Russian (Salsola kali), Thistle, sow (Sonchus oleraceus), Vetch, hairy (Vicia villosa), Violet, common blue (Viola sororia), Violet, field (Viola arvensis), Violet, wood (Viola sororia), Wild buckwheat (Polygonum convolvulus), Wild garlic (Allium vineale), Wild onion (Allium canadense), Woodsorrel, creeping (Oxalis corniculata), Woodsorrel, yellow (Oxalis stricta)
Estaprop XT (EPA# 34704-[illegible])	Turf	Dichlorprop-P(2-ethylhexyl) ester 2,4-D 2-ethylhexyl ester		
IPCO Dichlorprop-P (EPA# 21662-[illegible])		Dichlorprop-P(2-ethylhexyl) ester 2,4-D 2-ethylhexyl ester		
IPCO Dichlorprop-DX (EPA# 34704-[illegible])		Dichlorprop-P(2-ethylhexyl) ester 2,4-D 2-ethylhexyl ester		
Turboprop 600 (EPA# 21662-[illegible])	Landscape Ornamentals, Turfgrass	Dichlorprop-P(2-ethylhexyl) ester 2,4-D 2-ethylhexyl ester		

Note: Mecoprop-p is registered for use only on [illegible]

Crops, Grazing and Cutting

Rule: [illegible] Grazing/Cutting Restrictions [illegible]

Crop	Days
Barley (not undersowed with legumes)	[illegible]
Spring wheat, including durum (not undersowed with legumes)	[illegible]
Winter wheat	[illegible]
Other crops (oats, mustards, alfalfa hays, alfalfa seed crops)	[illegible]

Weeds, Rates and Timing

Agricultural Rate: Apply when weeds are young and actively growing, before reproductive stage. Application Rate: Apply the equivalent of [illegible] in a solution [illegible]

Weeds controlled (Rate given is for the smallest listed weed. Rate for larger weeds may be higher.)	Application Rate	Application Timing
annual sow thistle	[illegible]	[illegible]
bull mallow	[illegible]	[illegible]
burdock	[illegible]	[illegible]
burdock	[illegible]	[illegible]
Canada thistle (top growth control only)	[illegible]	[illegible]
cocklebur	[illegible]	[illegible]
curled dock (top growth control only)	[illegible]	[illegible]
dandelion, common (top control)	[illegible]	[illegible]
dog mustard	[illegible]	[illegible]
Dovefoot	[illegible]	[illegible]
field bindweed	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Suppression only. Repeated spring treatments will be necessary for adequate control.		
thistle	[illegible]	[illegible]
wild mustard	[illegible]	[illegible]

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[illegible]	[illegible]	[illegible]	[illegible]

Everest 3.0/Sierra 3.0 (cont'd)

Tank-mix partner	Tank-mix partner rate	Everest Rate mL/acre	
		Grassy weeds only	Grass foxtail only[***]
Bullow SC/Trophy 6SC + [illegible]	Bullow SC: 12 g/acre; Trophy 6SC: 9 g/acre + [illegible] up to 0.45 L/acre	20 - 25 mL	15 mL
Target	0.8 - 3.0 L/acre	Do not use	15 mL
Spectrum	Spectrum A: 40 mL/acre; Spectrum B: 0.6 L/acre	20 - 25 mL	15 mL
Stellar A	0.8 L/acre	20 - 25 mL	15 mL
Thumper/Leader	Thumper: 0.8 L/acre; Leader: 0.6 L/acre	20 - 25 mL	15 mL
Triton C	2L g/acre + sufficient	20 - 25 mL	15 mL
Trophy	Trophy A: 0.29 L/acre + Trophy B: 0.372 L/acre	20 - 25 mL	15 mL
[illegible]			
[illegible]	Up to 0.40 L/acre; Entree: 0.29 L/acre Extra	20 - 25 mL	15 mL
Cutlass 4E	0.265 - 0.8 L/acre	20 - 25 mL	15 mL
Frontline	Frontline A: 40 mL/acre; Frontline B: 0.29 L/acre	20 - 25 mL	15 mL
[illegible]			
Spectrum	Spectrum A: 40 mL/acre; Spectrum B: 0.6 L/acre	20 - 25 mL	15 mL
[illegible]			
[illegible]	0.8 L/acre or equivalent	20 - 25 mL	15 mL
Buctril 4E/Logic 4E	Buctril 4E: 0.8 L/acre; Logic 4E: 0.6 L/acre	20 - 25 mL	15 mL
4E/2S [illegible]	0.8 L/acre or equivalent	20 - 25 mL	15 mL
Bullow SC/Trophy 6SC	Bullow SC: 12 g/acre; Trophy: 9 g/acre	20 - 25 mL	15 mL

Note: All mixes must be applied with a non-ionic surfactant (Agral 90, Ag Surf, Surf 60, Super Spreader @ 750 mL/100 L or 0.25% v/v or 0.25 L per 100 L spray solution, unless otherwise indicated.

[*] Reduction in wild oat control may be observed with this tank-mix partner. [**] Addition of a second surfactant is not required. [***] Apply specified rate in at least 40 L/acre of water for dense stands.

Application Information

Apply with: Ground equipment. **Water Volume:** 20 - 40 L/acre.

Mixing Instructions

Use mixing instructions "A" on page 15.

Application Tips

When spraying under the conditions of waterlogged or saturated soils, temperature extremes such as heat or freezing weather, drought, low fertility or plant disease which can show unrecognizable injury symptoms. Weed control may also be reduced by these same conditions.

How it Works

Fluazifop-p-sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant.

Expected Results

Growth of susceptible plants stops soon after application. Symptoms include discolouration (yellowing, reddening and purpling), and complete control may take 1 to 2 weeks.

Restrictions

Rainfall: Do not apply if it is raining or if rainfall is expected within 1 hour after application. **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock. **Pre-harvest Intervals:** Observe minimum interval to harvest of 80 days after treatment. **Re-cropping:** The following crops may be planted 11 months after an application of Everest.

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Soil zones and rotational crops			
Dark Brown	Black	Dark Brown	Brown
Spring wheat	Spring wheat	Spring wheat	Spring wheat
Barley	Barley	Barley	
Canola	Canola	Canola	
Field peas*	Field peas*	Field peas*	
	Field bean	Flax	
	Flax	Durum wheat	
	Durum wheat		

*Field peas can be successfully grown the year following fucarbazone sodium application providing the following three criteria are all met: 1. Soil pH must be below 7.5. 2. Organic Matter content must be above 4%. 3. Precipitation must be equal to or above the 10 year average (minimum 100 mm within 60 days of application in year of application).

Environmental Precautions
Do not allow this chemical to drift onto other crops, especially canola, tame oats, or other non target crops.

Toxicity
Low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Heated storage is required.

Everest GBX

Group 2, 4

Formulation

Product	Company	Active ingredient	Formula	Container size
Everest 2.0 (PCP#28[illegible])	Arysta LifeScience	Flucarbazone: 257 g/L	Suspension concentrate	1,937 L
GBX (PCP#2[illegible])	Dow AgroScience Canada	Florasulam: 333 g/L	EC	2 x 5 L

BD - 100 acres per crop

Crops, Staging and Rates

Crop	Stage	Rate
All spring wheat varieties	2 leaf to 4 leaf, plus 2 tillers	19 mL/acre Everest 2.0 + 100 mL/acre GBX
		24 mL/acre Everest 2.0 + 125 mL/acre GBX

BD - 100 acres per crop

Note: Everest GBX should not be used alone, refer to tank mix options.

Weeds and Staging
Cereals: 1 to 6 leaf stage.

Broad leaves: 2 to 4 leaf stage (Refer to tank mix partner labels for additional weed staging information)

Grassy weeds controlled			
green foxtail	Japanese brome	volunteer oat	wild oat

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Everest GBX (cont'd)

Broadleaf weeds controlled

cleaver (1 - 4 whorls)	redroot pigweed	wild mustard
green smartweed	shepherd's purse	volunteer canola
kochia	stinkweed	volunteer flax**

* Refer to tank mix partner labels for additional broadleaf weeds and staging.

** 60 acres per case rate only.

Registered Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
2,4-D Ester 700*	Spring wheat	0.26 L/acre or 0.34 L/acre	0.25 % v/v
MCPA Ester 600*	Spring wheat	0.38 L/acre	
Refine SG/Deploy	Spring wheat	12 g / 8 g acre	
Curtail M	Spring wheat	610 - 810 mL/acre	

*Crop staging for 2,4-D tank mix is from 4 leaf to flag leaf, with MCPA from 3 leaf to flag leaf.

Application Information

How to apply: Apply with ground equipment, do not apply by air. **Water Volume**: 45 L/acre.

Mixing Instructions

Use mixing instructions "d" on page 13.

Application Tips

The activity of Everest GBX combined with tank mix partner herbicides are influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions or if weed populations are heavy or too far advanced.

How it Works

Flucarbazone sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant. Fluroxypyr moves within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Flucarbazone sodium causes growth of susceptible plants to stop soon after application. Symptoms include discolouration (yellowing, reddening and purpling), and complete control may take 1 to 2 weeks. Fluroxypyr causes broadleaf weeds to twist shortly after application. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Do not apply if rain is expected in 1 hour. **Grazing**: Do not feed or graze treated fields. Wheat grain or straw from treated fields may be fed to livestock. **Pre-harvest Intervals**: Observe minimum interval to harvest of 80 days after treatment. **Re-cropping**: The following crops may be planted 11 months after application. **Black soil zone**: Barley, canola (all varieties), durum wheat, field bean, field pea*, flax, spring wheat. **Brown soil zone**: Spring wheat. **Dark Brown soil zone**: Barley, canola (all varieties), durum wheat, field bean, field pea*, flax, spring wheat. **Gray-Wooded soil zone**: Barley, canola (all varieties), field pea*, spring wheat.

* Field peas can be successfully grown the year following an Everest application providing the following three criteria are all met:

1. Soil pH must be below 7.5
2. Organic Matter content must be above 4%.
3. Precipitation must be equal to or above the 10 year average (minimum 100 mm within 60 days of application in year of application). Rotational crops can be adversely affected if rainfall is below normal (10 year average) during the year of application.

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Everest applications to eroded knolls in the Dark Brown and Black soil zones with low organic matter (less than 2%) and high pH (greater than 7.5) or to Gray Wooded soils with highly variable soil texture and organic matter may result in delayed development or reduced yield of rotational crop.

Environmental Precautions

Do not allow this chemical to drift on to other crops, especially canola, tame oats, or other non target crops.

Toxicity

Flucarbazone sodium has low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg. Fluroxypyr has low acute mammalian toxicity. Acute oral LD_{50} (rate) = > 2,000 mg/kg.

Storage

Store in dry, heated area.

Express FX

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express SG (PCP# 28262)	E. I.duPont Canada	Tribenuron-methyl: 50%	Soluble granules	486 g bottle
DuPont Dicamba L (PCP# 31536)	E. I.duPont Canada	Dicamba: 480 g/L	Solution	4.7 L jug

Note: Express FX is purchased alone but must be tank mixed with glyphosate before use.

Crops, Staging and Rates

Rate: Express SG: 6 g/acre. DuPont Dicamba L: 59 ml/acre. 1 case treats 80 acres.

Crop	Staging	Comments
Barley, spring wheat (including durum)	1 day prior to seeding	Must be tank mixed with glyphosate.

Registered Tank Mixes

Tank mix partner	Express SG plus tank mix partner rate	Weeds controlled	Stage
glyphosate (present as potassium salt, isopropylamine salt, ammonium salt or trimethylsulfonium salt) plus DuPont Dicamba L Herbicide	Express SG: 6 gm/acre + DuPont Dicamba L: 59 ml/acre + glyphosate acid equivalent at .5 L/acre (360 gm AI/L)	Canada fleabane, common ragweed, kochia (including Group 2 and Group 9 resistant biotypes), narrow leaved hawk's beard, scentless chamomile (suppression)	Up to 8 cm
		dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp-nettle, kochia, lady's-thumb, lamb's-quarters, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate-tolerant varieties), volunteer flax, volunteer wheat, wild mustard, wild oats	Up to 15 cm
		cow cockle, wild buckwheat	Up to 3 leaf
		Canada thistle (suppression), white cockle (suppression)	Rosettes

Application Information

With: Apply with ground equipment. Do not apply by air. **Water Volume:** 22 L/acre.

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Express FX (cont'd)

Mixing Instructions
Use mixing instructions "b" on page 13.

Application Tips
Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours.

How it Works
Absorbed by foliage and roots, inhibits cell elongation and disrupting metabolism.

Expected Results
Express FX stops the growth of susceptible weeds immediately. However, typical symptoms (discoloration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

Restrictions
Rainfall: 4 hours. Grazing and harvesting: Do not graze or feed to livestock within 7 days of application.
Re-cropping: Any crop may be planted in the year following the use of Express FX.

Environmental Precautions
Overspray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs or dry slough borders, or woodlots should be avoided. Do not contaminate irrigation water. Toxic to aquatic organisms and non-target terrestrial plants. Avoid application when heavy rain is forecast. Observe a 3 metre buffer zone for terrestrial habitat.

Toxicity
Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 2,629 mg/kg. May irritate eyes, nose, throat and skin.

Storage
Store in a cool, dry place.

Express Pro/Nuance Pro

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express Pro (PCP# 29212)	E. I.duPont Canada	Tribenuron-methyl: 42.9% + metsulfuron methyl: 8.6%	Soluble granules	567 grams
Nuance Pro (PCP# 31873)	FMC Corp			560 grams

Note: Must be mixed with glyphosate (those present as a potassium or isopropylamine or ammonium or trimethylsulfonium salt).

Crops, Staging and Rates

Crop	Staging	Rate
Barley, spring wheat (including durum), winter wheat	1 day prior to seeding	Express Pro: 7 g/acre + glyphosate acid equivalent at .5 L/acre (360 gm AI/L)
Summerfallow		
Post-harvest*	Only spring wheat, durum wheat, barley, oats may be seeded the following spring.	

* Registered use only for Express Pro.

Do not apply to wheat and barley undersceded to legumes or grass.

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Weeds and Staging

Weeds controlled	Stage
Canada fleabane, cleavers, common ragweed, narrow leaved hawk's beard, scentless chamomile, night flowering catchfly* (suppression)	Up to 8 cm
Chickweed*	1 - 6 leaf
Dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp nettle, kochia, lady's thumb, lamb's-quarters, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate tolerant), volunteer flax, volunteer wheat, wild mustard, wild oats	up to 15 cm
Cow cockle, wild buckwheat	up to 3 - leaf
White cockle*	rosette

* Express Pro only.

Registered Tank Mixes

If using lower than the ½ L rate of glyphosate, adjuvant is required with the mix.

Application Information

Ground application only. **Water Volume**: Ground (22.5 - 45 L/acre).

Mixing instructions

Use mixing instructions "b" on page 13.

Application Tips

Do not use more than 7 gm/acre/year. Do not apply to crops underseeded to legumes or grasses. With any summerfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at time of application will be controlled. Weeds must be actively growing at time of application or control might be reduced. Do not re-enter treated fields until 12 hours after application. Once dissolved, Express Pro/Nuance Pro herbicides will not settle out, even if the sprayer is parked for long periods of time. Spray preparation should be used within 24 hours or product degradation may occur.

Do not use on highly variable soils that have large gravelly or sandy areas, eroded knolls or calcium deposits.

- Express Pro/Nuance Pro applied to fields to be planted to spring wheat, durum wheat, winter wheat or barley that are stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage may result in crop injury as crop injury may occur. Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Conditions such as thin crop stand, sandy soil or low soil organic matter may increase the severity of injury.

How it Works

Express Pro/Nuance Pro rapidly stops growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Activity of the herbicide mixture may be delayed by cold, dry conditions after application.

Rainfall: Heavy rainfall immediately after application may wash the herbicide off the foliage, which may reduce the effectiveness of Express Pro/Nuance Pro. Do not apply if rain is forecast for the time of application.

Restrictions

Re-cropping: Fields treated with Express Pro/Nuance Pro may be seeded to wheat (spring, durum or winter) or spring barley a minimum of 24 hours after application. The following crops may be seeded 10 months after application: Canola, flax and peas.

Environmental Precautions

Toxic to aquatic organisms and non-target terrestrial plants. Use a buffer zone of 4 metres between sprayed area and sensitive habitat.

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Express Pro/Nuance Pro (cont'd)

Toxicity

Tribenuron methyl: Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg. Metsulfuron methyl: Low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

Express SG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express SG (PCP# 28262)	E. I.duPont Canada	Tribenuron-methyl: 50%	Soluble granules	486 g bottle

Note: Express SG is purchased alone but must be tank mixed with either 2, 4-D or glyphosate before use.

Crops, Staging and Rates

Rate: Express SG: 6 g/acre

Crop	Staging	Comments
Barley, spring wheat (including durum), winter wheat, oats, canary seed, pulses (including dry beans*, fababeans*, lupins*, field peas*, soybeans*) ExpressSun® sunflowers	1 day prior to seeding	Must be tank mixed with glyphosate.
Pasture and rangeland	Early bud to prebloom for weeds	Use a minimum of 22.5 L/acre of water.
Alfalfa, red clover and alsike clover (grown for seed or forage)	Proseed 24 hours prior to seeding.	Must be tank mixed with glyphosate with a minimum of 22.5 L spray solution/ acre. Injury to crop may occur on coarse textured soil or low organic matter matter(< 3%) soils.
Summerfallow		Must be tank mixed with 2,4-D or glyphosate.
Post-harvest		Fields treated with a post-harvest application may be seeded in the spring to spring wheat, durum wheat, spring barley, oats, canary seed or pulse crops (including dry bean, faba bean, field pea, lupin, and soybean), canola, flax, lentils, alfalfa, red clover or alsike clover or fields may be summerfallowed.
Smooth bromegrass, meadow bromegrass, timothy, creeping red fescue	Can be seeded after a post harvest treatment, the next spring, or preseed 24 hours prior to seeding	Must be tank mixed with glyphosate with a minimum of 22.5 L spray solution/ acre. Injury to crop may occur on coarse textured soil or low organic matter matter(< 3%) soils.
Tribenuron-methyl tolerant sunflowers	2 - 8 leaf	Tank mix with Assure II.

* Express SG should not be used prior to registered pulse or forage crops on soils with greater than 50% sand or less than 3% organic matter.

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Registered Tank Mixes

Tank mix partner	Express SG plus tank mix partner rate	Weeds controlled	Stage
Annual and perennial weed burn-off (prior to seeding) in canola, canary seed, fallow, alfalfa, red clover, alsike clover and pulse crops			
glyphosate (present as potassium salt, isopropylamine salt, ammonium salt or trimethylsulfonium salt)	Express SG: 6 g/acre + glyphosate acid equivalent at 1 L/acre (360g/L A.E.)	Canada fleabane, common ragweed, narrow leaved hawk's beard, scentless chamomile (suppression)	Up to 8 cm
		dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp nettle, kochia, lady's thumb, lamb's quarters, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate-tolerant varieties), volunteer flax, volunteer wheat, wild mustard, wild oats	Up to 15 cm
		cow cockle, wild buckwheat	Up to 2 leaf
		Canada thistle (suppression), white cockle (suppression)	Rosettes
Summerfallow			
2,4-D ester LV-700	Express SG: 6 g/acre + 2,4-D ester	flixweed, stinkweed and other weeds listed on the 2,4-D label.	Fall rosettes and spring seedlings
Rangeland and pasture			
	Express SG: 6 g/acre alone plus non-ionic surfactant at 0.2% v/v (2 L/1000 L spray solution)	Control of tall buttercup, narrow leaved hawk's beard	Early bud to pre-bloom
	Express SG: 12 g/acre plus non-ionic surfactant at 0.2% v/v (2 L/1000 L spray solution)	Control of above weeds plus dandelion, white cockle, common ragweed	Early bud to pre-bloom
Expressions sunflower (2 - 8 leaf)			
Express + Raxil MT adjuvant	Express SG: 6g/acre + Raxil MT spray adjuvant at 0.5% v/v (5 L/1000 L spray solution)	lamb's-quarters (control), wild buckwheat (suppression)	Up to 8 leaf (lamb's-quarters), 1 - 4 leaf wild buckwheat
Assure II	Express SG: 6 g/acre + Assure II: 0.2 - 0.3 L/acre + Merge: 0.5 - 1.0% v/v or Sure-Mix: 0.5% v/v	lamb's-quarters (control), wild buckwheat (suppression) plus all other weeds according to rates of one on Assure II label	Actively growing weeds on Assure II label

(1) *Adfert supports the following uses not on the Express SG label for Expressions sunflowers only: Assure II.*

Application Information

Apply with *ground equipment*. Do not apply by *air*. **Water Volume:** 22.5 - 45 L/acre.

Mixing Instructions

Use mixing instructions 'B' on page 13.

Application Tips

Effectiveness may be reduced if spray mixtures remain in the tank for more than 24 hours. Injury to pulse crops may occur on coarse-textured soils, low in organic matter (less than 7%), or on fields with variable soils, gravelly areas, sandy areas or crested knolls. Avoid planting pulse crops in soils containing more than 50% sand.

How it Works

Absorbed by foliage and roots, inhibits cell elongation.

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Expected Results

Express SG stops the growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 – 7 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

Restrictions

Rainfall: If rain occurs soon after application, control may be reduced. 1 hour of dry weather is needed to allow Express SG to be absorbed by weed foliage. **Pre-harvest intervals:** Do not apply within 70 days of harvest for Expressfree® sunflowers. **Re-cropping:** A minimum re-cropping interval of 2 months should be left between the application of Express SG and seeding of the next crop. The following crops can be seeded two months after application of Express SG herbicide: canola, flax, lentils.

Environmental Precautions

Do not contaminate irrigation water. Toxic to aquatic organisms.

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > > 5,000 mg/kg. May irritate eyes, nose, throat and skin.

Storage

Store in a cool, dry place.

FirstStep Complete

Group 2 ❖

Formulations

Product	Company	Active Ingredient	Formulation	Container size
FirstStep (PCP# 29669)	Nufarm Products Canada	tribenuron-methyl, 75%	Dry flowable solution	100 g/FirstStep
Huskie (PCP# 29459)		pyrasulfotole, 140 g/L		1 x 10 L cap of glyphosate

One case FirstStep Complete treats 40 acres.

Crops, Staging and Rates

Crop	Stage	Rate
Pre-seed burndown (prior to planting barley, winter wheat and spring wheat, including durum); summerfallow applications	Pre-seed burndown, summerfallow	FirstStep Xpress: 4 g/acre
		Huskie: 0.25 L/acre
		Spike-Up: 0.5 L/acre

Note: Crop Oil: Apply to fields at least 24 hours prior to seeding of spring wheat (including durum or barley). If used in summerfallow, allow at least 10 days to elapse before tillage.

Registered Tank Mixes

None.

Weeds Controlled

Summerfallow: *At control of fall rosettes and spring seedlings of narrow-leaved hawk's-beard and stinkweed. Apply the tank mix in the spring after emergence, up to early flowering stage. Only the weeds that have emerged at the time of application will be controlled.*

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Grassy weeds controlled

downy brome	green foxtail	witchgrass
giant foxtail	volunteer cereals	yellow foxtail

Broadleaved weeds controlled

Canada thistle	kochia	volunteer canola (including glyphosate-tolerant)
Canada thistle*	lady's thumb	wild buckwheat
cleavers	lamb's quarters	wild mustard
common ragweed	narrow-leaved hawk's-beard	wild oat (Avena fatua)
dandelion (up to 15 cm rosette)	redroot pigweed	wild sunflower
flixweed	Russian thistle	wild sunflower (volunteer)
hemp nettle	shepherd's-purse	
*Suppression		

Re-cropping restrictions: Wait a minimum of 120 days after application before planting any crop other than fall cereals, spring cereals, corn, soybeans, canola, flax, sunflowers, field peas, lentils, chickpeas, dry beans, forages, grasses, or pasture.

Application Information

Spray with: Ground equipment. Do not apply by air. Water Volume: Apply at 50 - 100 L/ha for best use of water for FreeStep.

Mixing Instructions

Fill tank ½ to ⅔ with water, add FreeStep, then glyphosate, then fill tank.

Application Tips

Note: Any factor favouring conditions promoting active weed growth and vigour after application of FreeStep Complete (e.g., adequate soil moisture, warm temperatures, fertility, etc.) may improve the speed and consistency of symptom development. Under conditions unfavourable for active weed growth (e.g., drought stress, cool temperatures, reduced sunlight intensity, etc.), symptom development may be delayed or reduced. Weeds under moisture stress at the time of application may not be adequately controlled. Weeds that emerge after application will not be controlled. Use the higher rate of FreeStep Complete when weeds are actively growing and under stress from dry conditions, when weeds are growing in dense stands, or when weeds are more than 10 cm tall or across.

Mode of Action

FreeStep is absorbed by foliage and roots, inhibits cell elongation. Susceptible weeds exposed to FreeStep Complete absorb the herbicide through the foliage and the roots, resulting in plant mortality.

Expected Results

FreeStep rapidly stops growth of susceptible weeds. Symptoms typical of systemic herbicides (i.e., chlorosis, necrosis, stunting, etc.) may appear within 7 to 14 days after application, depending on prevailing conditions and weed susceptibility. Annual weeds susceptible to FreeStep will wilt and yellow within 2-4 days. Perennial weeds will wilt and yellow within 7-10 days. **Rainfall:** If rain occurs within 4 - 6 hours after application, control may be reduced. **Resistance to Weeds:** FreeStep carries Group 9 as the active ingredient. Group has negligible resistance to the weeds.

Restrictions

Re-cropping: FreeStep Complete has a minimum re-cropping interval of 7 months between application and seeding of canola, flax, lentils and alfalfa. **Grazing:** Do not graze livestock in treated areas within 7 days of application.

Toxicity

FreeStep and SureUp have a very low acute oral toxicity. FreeStep has an acute oral LD_{50} (rats) > 5,000 mg/kg. SureUp has an acute oral LD_{50} (rats) > 5,000 mg/kg. Prolonged or heavy skin contact

Storage

Store in cool, dry place.

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Fetus

Recommendations

Product	Dosing	Dose Adjustments	Precautions	Monitor Labs
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Drugs, Imaging, and Tests

Prior to starting or up to 1 days after starting

Drug	Risk with Fetal Uptake
[redacted]	[redacted]

Results Controlled

Pre-emergence control of

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Registered Yard Offices

Pre-emergence emergence: [redacted]

Qualitative Information

Note: [redacted]

Expected Results

[redacted]

Restrictions

Restrict: [redacted]

Post-Treatment Precautions

[redacted]

Example

Basic all-purpose crampon to cover 90 - 110N individual forces

Fortress

Recommendations

Crampon Fitting and Points

Step: 1-2-3 - 1-2-3-4 points

Point	Note
Bindings Front Rear points Secondary bindings (rear) Offset spring bar fitment	Fit to boot, approximately 1 mm from the front of the sole unit Fit to boot, approximately 1 mm from the rear of the sole unit Fit to boot, 10 - 15 mm from the front of the sole unit Fit to boot, approximately 1 mm from the rear of the sole unit Fit to boot, approximately 1 mm from the rear of the sole unit

* Fit to boot, as per the manufacturer's guidelines

Climate Control Effect

Note

Apply Fortress according to unit layout, switch controls

Fortress Crampon Recommendations								
Type	Mountaineer				Mountaineering / Hill Walking			

[1] [2] [3] [4] [5] [6]

[1] Fit to boot, as per the manufacturer's guidelines, apply 100 kg per rear region, check control function

[2] Fit to boot, as per the manufacturer's guidelines

Fits	Measurement				Measurement x Intervention			
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[

Registered Tank Mixes

Tank mix partner	Frontline XL/Topline plus tank mix partner	Additional weeds controlled
No spring wheat (including durum) and barley		
Avenir	Frontline XL 1.0 L/acre + Avenir 1.00 L/acre + Activator DB Topline Formulation 40 mL/acre + MSO% 1.0% L/acre + Avenir 1.00 L/acre + Activator	wild oats
No spring wheat (including durum) and barley		
Everest	Frontline XL 1.0 L/acre + Everest 10 g/acre + Agral 90 0.25 % v/v DB Topline Formulation 40 mL/acre + MSO% 1.0% L/acre + Everest 10 g/acre + Agral 90 0.25% v/v	wild oats and green foxtail
Horizon, Boxstang, Fusilade, Signal	Frontline XL 1.0 L/acre + Horizon 50 mL/acre + Score 0.5% v/v DB Topline Formulation 40 mL/acre + MSO% 1.0% L/acre + Horizon 50 mL/acre + Score 0.5% v/v	wild oats
	Frontline XL 1.0 L/acre + Horizon 100 mL/acre + Score 1.0 % v/v DB Topline Formulation 40mL/acre + MSO% 1.0% L/acre + Horizon 100 mL/acre + Score 1.0% v/v	wild oats and green foxtail
Simplicity (Frontline only)	Frontline XL 1.0 L/acre + Simplicity 250 mL/acre	wild oats, downy brome, Japanese brome, green foxtail and additional broadleaf weeds. Consult label.
No spring wheat (including durum) and barley		
Valid	Frontline XL 1.0 L/acre + Valid 280ml L/acre + Adigor 250 mL/acre DB Topline Formulation 40mL/acre + MSO% 1.0% L/acre + Valid 280 mL/acre + Adigor 250 mL/acre	wild oats, green foxtail and volunteer oats

Application Information

Note: Ground equipment only. Do not apply by air. **Water Volume:** 40 L/acre.

Mixing Instructions

Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding Frontline XL. Use mixing instructions "B" on page 11.

Application Tips

Do not apply to crops underseeded to legumes. Apply Frontline XL/Topline early post-emergence to the main flush of broadleaf weeds. Warm, moist conditions that promote active weed growth, small weed size and competitive crop and good growing conditions after application will optimize the weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that are emerged at time of application will be controlled. If the foliage of the weed is wet at the time of application, control may be reduced.

How it Works

Frontline XL/Topline herbicides contain a Group 2 and a Group 4 mode of action herbicide. The Group 2 mode of action herbicide inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids required for plant growth. The Group 4 mode of action herbicide disrupts normal plant growth regulation, resulting in death of susceptible plants.

Expected Results

Weeds susceptible to Frontline XL/Topline will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red coloration may not be noticeable for 1 - 2 weeks. Some twisting may also be observed on weeds sensitive to MCPA. Warm, moist conditions, small weed size and competitive crop will optimize weed control provided by Frontline XL/Topline.

Restrictions

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut hay within 7 days after

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application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Interval:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** barley, canola, chickpeas, corn, field beans, flax, Juncea canola, lentils, mustard (brown, oriental and/or yellow), oats, peas, potatoes (except seed potatoes), soybeans, sunflowers, or wheat or fields can be followed.

Environmental Precautions

Highly toxic to aquatic organisms and non-terrestrial plants. Observe buffer zones specified under Directions for Use on the label.

Toxicity

Frontline XL/Topline are practically non-toxic to birds. Acute oral LD_{50} is > 2,000 mg/kg. Frontline XL/Topline are also moderately toxic to fish.

Storage

Store in a dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

Frontline 2,4-D XC

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Frontline 2,4-D XC A (PCP# 30868)	Dow AgroSciences	Florasulam: 50 g/L	Suspension concentrate	1.6 L
Frontline 2,4-D XC B (PCP# 30881)		2,4-D LV ester: 660 g/L	Suspension concentrate	2 x 6.8 L

Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat (including durum)	3 leaf fully expanded to 6 leaf	Frontline 2,4-D XC A: 40 mL/acres Frontline 2,4-D XC B: 340 mL/acres

Weeds and Staging

Weeds controlled at the 2 - 6 leaf stage

- annual sow thistle
- annual sunflower
- tall mustard
- thistle
- burdock
- chickweed
- cleavers
- cocklebur
- common ragweed
- dandelion*
- flixweed
- kochia**
- lady's thumb
- lamb's quarters
- narrow-leaved hawk's-beard***
- plantain
- prickly lettuce
- redroot pigweed
- Russian thistle
- shepherd's purse
- smartweed
- stinkweed
- tartary buckwheat
- vetch
- volunteer canola***
- wild buckwheat
- wild mustard
- wild radish

Weeds suppressed

- Canada thistle (top growth only)
- hemp nettle
- perennial sow thistle (top growth only)

* Seedlings and overwintering rosettes. ** Up to 5 cm in height. *** All types of volunteer canola including herbicide tolerant. **** 1 - 2 leaf stage.

Registered Tank Mixes

Tank mix partner	Frontline 2,4-D plus tank mix partner rate	Additional weeds controlled
Assert	Frontline 2,4-D XC A: 40 mL/acres + Frontline 2,4-D XC B: 340 mL/acre + Assert: 0.65 L/acre + Assistant	wild oats
Everest	Frontline 2,4-D XC A: 40 mL/acres + Frontline 2,4-D XC B: 340 mL/acre + Everest: 20 - 25 mL/acre + Ag Surf or Agral 90: 0.25% v/v	wild oats and green foxtail

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Frontline 2,4-D XC (cont'd)

Tank mix partner	Frontline 2,4-D plus tank mix partner rate	Additional weeds controlled
Simplicity	Frontline 2,4-D XC A: 27 mL/acres. + Frontline 2, 4-D XC B: 225 mL/acre + Simplicity: 150 - 200 mL/acre	At the 200 mL/acre rate of Simplicity, the mix will control wild buckwheat and labelled weeds for Simplicity and Frontline 2,4-D. The lower rate of Simplicity at 150 mL/acre will control wild oats at < 75 plants/metre^2. Consult label for specific broadleaf weeds controlled.

Application Information

With: Ground equipment only. With a sprayer that can apply 40 L/acre of spray solution. Do not apply by air.

Water Volume: 40 L/acre.

Mixing Instructions

Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding Frontline 2,4-D. Use mixing instructions "b" on page 13.

Application Tips

Do not apply to crops underseeded to legumes. Apply Frontline 2,4-D early post-emergence to the main flush of broadleaf weeds. Warm, moist conditions that promote active weed growth, small weed size, competitive crop and good growing conditions after application optimize weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that are emerged at time of application will be controlled. If the foliage of the weed is wet at the time of application, control may be reduced.

How it Works

Florasulam SC is taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. 2,4-D is a systemic, non-selective herbicide, which readily moves through the foliage and root system. It inhibits pigment, including chlorophyll, leading to plant death.

Expected Results

Florasulam A symptoms will initially appear in the upper regions of the plant. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under ideal conditions, complete control may occur within 7 - 10 days after application. Plants susceptible to 2,4-D will become malformed before they die.

Restrictions

Rainfall: Do not apply if rainfall is expected within 2 hours. **Grazing**: Do not harvest as forage within 30 days after application. Do not permit lactating dairy animals to graze fields within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Intervals**: Do not harvest the treated mature crop within 60 days after application. **Re-cropping**: Fields previously treated with Frontline 2,4-D tank mix can be seeded the following year to barley, canola, oats, peas, wheat, chickpea, corn, field beans, flax, juncea canola, lentils mustard (brown, oriental and/or yellow), potato, soybean and sunflower as rotational crops or fields can be summerfallowed.

Environmental Precautions

Frontline 2, 4-D is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. This product has potential to leach. Use a 30 m buffer between sprayed area and sensitive habitats.

Toxicity

2,4-D A is highly toxic to aquatic organisms. It is also slightly toxic to birds. 2, 4-D B has a moderate acute mammalian toxicity. Acute oral LD_{50} (rats) 982 mg/kg. It can cause skin irritation and can be absorbed through the skin.

Storage

Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

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glyphosate

Group 9

Formulation

Product	Company	Acid equivalent concentration	Formulation	Container size
Clearout 41 Plus (PCP# 28322)	Albaugh Inc.	360 g/L	Solution	115 L, 1000 L
Credit 45 (PCP# 29124)	Nufarm Agriculture	450 g/L	Solution	10 L, 450 L, 1000 L
Glyfos (PCP# 27287)	FMC of Canada	360 g/L	Solution	10 L, 150 L, 450 L, 1000 L
KnockOut Extra (PCP# 29266)	Libertas Now Inc.	360 g/L	Solution	9.5 L, 30 L, 113 L, 940 L, 1040 L
Crush'R Plus (PCP# 29995)	Ag West Inc	360 g/L	Solution	9.5 L, 30 L, 113 L, 940 L, 1040 L
Matrix (PCP# 29775)	IPCO	480 g/L	Solution	10 L, 115 L 450 L
Maverick III (PCP# 29033)	Dow AgroSciences	480 g/L	Solution	10 L, 115 L, 450 L
MPower Glyphosate (PCP# 29290)	NewAgco Inc	360 g/L	Solution	115 L, 640 L, 1000 L
R/T 540 (PCP# 28487)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L
Roundup Transorb HC (PCP# 28198)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L, 1150 L
Roundup Ultra 2 (PCP# 28486)	Loveland Products	540 g/L	Solution	10 L, 115 L, 450 L
Roundup WeatherMax (PCP# 27487)	Monsanto	540 g/L	Solution	10 L, 115 L, 450 L, 1150 L
Sharpshooter (PCP# 28631)	Loveland Products Canada	356 g/L	Solution	10 L, 1000 L
Sharpshooter Plus (PCP# 28623)	Loveland Products Canada	360 g/L	Solution	10 L, 1000 L
Smoke (PCP# 31063)	Great Northern Growers	360 g/L	Solution	120 L, 1,000 L
StartUp (PCP# 29498)	Loveland Products	540 g/L	Solution	10 L, 115 L, 450 L, 667 L
Touchdown Total (PCP# 28072)	Syngenta	500 g/L	Solution	10 L, 115 L, 450 L, 946 L
Traxion (PCP# 29201)	Syngenta	500 g/L	Solution	450 L, 946 L
Vantage Plus Max II (PCP# 28840)	Dow AgroSciences	480 g/L	Solution	10 L, 115 L, 450 L
Vector (PCP# 30319)	Federated Cooperatives Ltd.	480 g/L	Solution	10 L, 115 L, 450 L, 960 L

Application Rates of glyphosate Products with Various Acid Equivalent Concentrations - first column is the actual amount of active ingredient applied per acre. The other columns are the actual L/acre needing to be applied to meet that acid equivalent value.

Acid Equivalent Concentration					
Acid Equivalent	360 g/L	450 g/L	480 g/L	500 g/L	540 g/L
g ae/acre*	L/acre				
111	0.31	0.24	0.225	0.216	0.20
122	0.34	0.264	0.25	0.238	0.22
148	0.41	0.32	0.30	0.288	0.27

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glyphosate (cont'd)

Application Rates of glyphosate Products with Various Acid Equivalent Concentrations - first column is the actual amount of active ingredient applied per acre. The other columns are the actual L/acre needing to be applied to meet that acid equivalent value.					
Acid Equivalent Concentration					
Acid Equivalent	360 g/L	450 g/L	480 g/L	500 g/L	540 gL
g ae/acre*	L/acre				
180	0.50	0.40	0.38	0.360	0.33
241	0.67	0.535	0.50	0.482	0.45
270	0.75	0.60	0.56	0.540	0.50
324	0.90	0.72	0.68	0.65	0.60
360	1.00	0.80	0.75	0.720	0.67
435	1.21	0.97	0.91	0.87	0.81
450	1.25	1.00	0.94	0.900	0.83
510	1.42	1.13	1.06	1.02	0.94
540	1.50	1.20	1.125	1.080	1.00
690	1.92	1.53	1.44	1.38	1.28
720	2.00	1.60	1.50	1.440	1.33
870	2.42	1.93	1.81	1.74	1.61
1000	2.78	2.22	2.08	2.00	1.85
1015	2.82	2.26	2.11	2.03	1.88
1740	4.83	3.87	3.63	3.48	3.22
1765	4.90	3.92	3.68	3.53	3.27

* g ae/acre = grams of acid equivalent per acre

Cropland Uses

Annual weed control prior to crop emergence or in summerfallow - all crops.

Quackgrass control - prior to seeding or after harvest.

Canada thistle control - summer-fallow, shelterbelts and post-harvest.

Dandelion control - prior to crop emergence or post harvest.

Other perennial weeds control - summerfallow, shelterbelts and post-harvest.

Spot treatments (in-crop) of perennial weed control - cereals, corn, soybean and forages.

Pre-harvest control of quackgrass, Canada thistle, milkweed, toadflax, dandelion, season-long control of perennial sow-thistle, and harvest management.

Weed control in glyphosate tolerant crops: canola, corn and sugar beet.

Post-harvest stubble treatments - all crops.

Weed control in non-crop areas: industrial, right-of-way, recreational and public areas.

Brush control, turf renovation, directed application in woody nursery stock, roadsides and shelterbelts.

Weeds Controlled

Annual

annual bluegrass
annual sow-thistle
barnyard grass
Canada fleabane
common chickweed
common ragweed
corn spurry
crabgrass
dodder
downy brome
flixweed
green foxtail
green smartweed
hemp-nettle
kochia*
lady's-thumb
lamb's quarters
narrow-leaved hawk's beard
narrow-leaved vetch
night-flowering catchfly
Persian darnel
prickly lettuce
red root pigweed
round-leaved mallow
Russian thistle
shepherd's-purse
smooth pigweed
stinkweed
stork's-bill
volunteer flax
volunteer mustard
volunteer wheat
wild mustard
wild oats
wild tomatoes

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Perennial

alfalfa	curled dock	Japanese knotweed	smooth bromegrass
Canada bluegrass	dandelions	kentucky bluegrass	toadflax
Canada thistle	field bindweed	perennial sow-thistle	wormwood
cattails	foxtail barley	poison-ivy	yellow nutsedge
common milkweed	hemp dogbane	purple loosestrife	
cottontop	hoary cress	quackgrass	

Brush

alder	douglas fir	poplar	snowberry
birch	hemlock	raspberry	willow
cedar	maple	rhododendron	withrod
cherry	pine	sheep laurel	

*Will not control kochia biotypes resistant to glyphosate.

Annual Weed Control Prior to Crop Emergence or in Summerfallow

Weeds controlled	Weed stage	glyphosate grams acid equivalent per acre	Surfactant per acre
Green foxtail, lady's-thumb, stinkweed, volunteer barley, volunteer canola (non-glyphosate tolerant), volunteer wheat, wild mustard, wild oats	Up to 8 cm in height	111	0.14 L
All weeds listed above plus suppression of foxtail barley, flixweed and kochia*	8 - 15 cm in height	148	0.14 L
All weeds listed above plus downy brome, giant foxtail, Persian darnel, Canada fleabane, common ragweed, flixweed, hemp-nettle, lamb's-quarters	Weeds up to 15 cm in height. For narrow- leaved hawk's-beard 8 - 15 cm or wild buckwheat (3 - 4 leaf stage) use high rate.	180 - 270	Surfactant is not required
All weeds listed above plus annual sow thistle, bluegrass, crabgrass, kochia, prickly lettuce, shepherd's purse, and narrow-leaved vetch	Up to 15 cm in height	324	Surfactant is not required
All annual grasses and broadleaved weeds listed above	Greater than 15 cm in height	510	Surfactant is not required

* Will not control kochia biotypes resistant to glyphosate.

Registered Tank Mixes in Minimum and Zero Tillage Systems Cropping Systems – Prior to Seeding

Not all glyphosate products are registered for all tank mixes below. Refer to individual glyphosate for registered tank mixes, glyphosate rates and registered crop species labels.

Spring wheat, winter wheat, barley and rye:

- glyphosate + 2,4-D (0.23 - 0.34 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4 leaf stage)
- glyphosate + 2,4-D (0.45 - 0.68 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 6 -leaf stage)
- glyphosate + Buctril M (0.2 - 0.4 L), Logic M (0.25 - 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4 -leaf stage)
- glyphosate + Banvel II (0.12 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola
- glyphosate + Express SG (6 grams/acre) + Agral 90 (0.35% v/v) for broad-spectrum weed control. Agral 90 only required if glyphosate rate is below 0.5 L/acre (360 gm active ingredient/L equivalent).
- glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre): for broad-spectrum weed control

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glyphosate (cont'd)

Field corn, sweet corn and flax:
- glyphosate + MCPA amine 500 (0.28 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4 -leaf stage)
- glyphosate + Buctril M (0.2 - 0.4 L/acre), Logic M (0.25 - 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4 -leaf stage)

Field corn only:
- glyphosate + Banvel II (0.12 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola

Field peas, lentils, and chickpeas:
- glyphosate + MCPA amine 500 (0.2 - 0.28 L/acre) for broad-spectrum weed control, including glyphosate tolerant canola. Note: use only amine formulations prior to seeding peas, lentils and chickpeas.

Canaryseed and seedling forage grasses (bromegrass, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, tall wheatgrass, Russian wildrye, timothy, orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass, and reed canarygrass)
- glyphosate + Buctril M (0.2 - 0.4 L), Logic M (0.25 - 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4 -leaf stage)

Registered Tank Mixes in Minimum and Zero Tillage Systems Cropping Systems – Cham fallow

- glyphosate + 2,4-D (0.5 L/acre)
- glyphosate + Banvel II (0.12 L/acre)
- glyphosate + Express SG (6 grams/acre)
- glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre)
- glyphosate + Express Pro (7 gm/acre)

Quackgrass Control Prior to Seeding or after Harvest in Annual and Forage Cropping Systems

Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.

Application on forages should be followed by tillage and should be made when good growing conditions exist.

	Weed stage	Acid equivalent in grams active ingredient per acre	Remarks
Quackgrass control: season long control on light to moderate infestation	3 - 4 green leaves. On fall tilled ground, delay the application until majority of quackgrass has 4 - 5 leaves	360	Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 - 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of - 5 C is usually tolerated by new shoots. Frost damage is evident by drying of new shoots shortly after frost.
Quackgrass control: heavy infestations or sod bound quackgrass	3 - 4 green leaves or more	360 - 1000	Use higher rate for sod bound quackgrass (left undisturbed for at least 2 years). Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 - 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of - 5 C is usually tolerated by new shoots.

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Canada Thistle Control: Summerfallow and Post Harvest

	Weed stage	Acid equivalent in grams active ingredient per acre	Remarks
Control of Canada thistle at the rosette stage (summerfallow)	Rosettes at least 15 cm in diameter	360	Conduct summerfallow tillage as usual and perform the last tillage operation between July 15 and August 1. Allow thistle to re-grow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage. Allow 10 or more days after treatment before tillage. Treatment after a mild frost is possible provided leaves are green and plants are actively growing.
Control of Canada thistle: post-harvest stubble treatment	Bud stage or beyond	648 - 1080	Allow 20 to 25 cm of new growth before application. Thistles must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage. Heavy frost prior to treatment may decrease control. Allow 5 or more days after treatment before tillage.

Registered Tank Mixes: Canada Thistle Control

- glyphosate + Banvel II (0.12 L/acre)

Dandelion Control: Prior to Seeding or After Harvest

For best results, apply up to and including dandelion bloom.

Dandelion stage of growth g/ae A.I./acre		Remarks
Less than 15 cm rosettes	Greater than 15 cm rosettes	
360	540 - 720	Allow 3 or more days after treatment before tillage for all rates. Use the higher rate when infestations are heavy.

Alfalfa Control (Fall Treatment)

Staging	Rate a.i. per acre	Remarks
Early bud to full bloom (fall application only)	540 - 720	Use high rate when alfalfa populations are high or when grass infestation is heavy. Allow at least 5 days before tillage. Apply in 23 - 136 L/acre water.

Registered Tank Mixes for Alfalfa Control (Fall and Spring)

The addition of 2,4-D may improve alfalfa control in situations where control may be more difficult to obtain, such as in minimum tillage systems where populations are heavy and with spring applications.

Tank mix	Acid equivalent in grams active ingredient per acre	Remarks
glyphosate + 2,4-D	glyphosate 360 - 720 g a.i./acre + 2,4-D 0.49 - 0.97 L	For spring applications, use only the low rate of 2,4-D (i.e., 0.49 L/acre) and recommended rate of glyphosate.Only cereal crops not underseeded to legumes may be planted following spring applications of this tank mix, and a 14-day interval between application and planting is required.

Spot treatment (in crop) of perennial weeds in wheat, oat, barley, corn, soybean forage legumes and forage grasses: glyphosate may be applied for the control of Canada thistle, quackgrass and other perennial weeds (absinthe, blue grass spp., smooth bromegrass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge in forage crops, barley, wheat, oats, soybeans and legumes, including seed production. Treatments may be made up to heading of small grain, initial pod set on soybeans and legumes, silking of corn, and emergence of seed heads. The crop in the treated area will be killed. Avoid drift beyond the treated area. Application can be made using a boom sprayer, knapsack, or high volume equipment. Applications should be made using the same rates and at the same growth stages as listed in the quackgrass, Canada thistle and other perennial weed control tables.

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Other Perennial Weed Control in Summerfallow, Shelterbelts and Post-harvest

Weeds controlled	Weed stage	Rate a.i. per acre	Remarks
Common milkweed	Bud to full bloom	1 lb	Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not all be in the correct stage, therefore, repeat treatments may be required.
Field bindweed	Full bloom or beyond	1.5 lb - 1.125 lb	Allow 7 or more days after treatment before tillage.
Foxtail barley	Seedling to heading	360 - 720	Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rates for larger, more established plants, heavy infestations or if plants are stressed.
Sowthistle rosette stage (summerfallow)	Rosettes at least 15 cm tall or across	360	Allow 7 or more days after treatment before tillage in summerfallow.
adults	Early bud to full bloom stage. Fall applications only.	540 - 720	Allow 5 or more days after treatment before tillage. Use the higher rates when dhalia populations are high or when heavy grass infestations are also present.

Pre-harvest Perennial Weed Control

Crop: Wheat, barley (excluding malting barley*), oats*, canola (rapeseed), dry beans, flax (excluding solin), lentils, mustard (Weatherbee only), peas, soybeans and forages

Weeds Controlled: Quackgrass, Canada thistle, common milkweed, sowthistle, dandelion, perennial sow thistle (annual only)

Rate

Crops	
Wheat, barley (including malting barley*), oats*, canola (rapeseed), dry beans, flax (excluding solin), lentils, peas, soybeans	Forages
360 g a.e./acre	360-720

Caution: Do not apply to any crops if grown for seed.

*Barley grown for malt and barley set grown for milling are registered for the pre-harvest application. However, growers should contact malt barley and milling oat buyers prior to application to confirm acceptance of glycophosate treated grain.

** These crops are registered with IVP, Monitor, Transorb HC, Roundup WeatherMax and Roundup Ultra 2 only under Crop Approved When Use Label Expansion program. The manufacturer assumes no responsibility with respect to performance and/or crop tolerance claims for herbicide performance.

How to Apply

Ground (all products), Aerial: Do not apply to any except Glyfos, Glyphos Plus, Roundup Transorb HC, Roundup WeatherMax, Roundup Ultra 2, RT-540, CleanSlate 41Plus, MPower Glyphosate.

Crop Staging: Apply when average seed moisture is at or below 30%. Accurate measurement of seed moisture must be made before application. The following chart lists visual symptoms that can be used as guidelines as to when 30% grain moisture has been reached.

Crop*	Percent seed moisture	Visual symptoms
Wheat, barley, oat	Less than 30	Hard dough stage - a thumbnail impression remains on seed.
Canola (including glyphosate tolerant varieties)		Pods are green to yellow, most seeds are yellow to brown.
Flax (including low linolenic acid varieties)		Majority (75%-80%) of bolls are brown.
Forage	Not applicable	Forage 3 to 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained.

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Crop	Normal cut/ harvest	Post-applic
Pea	Late-Aug - Sept	Regrow 15% 40% of pods are brown
Lentils		Leaves turn pale brown, 15% are brown and seeds white
Dry beans		Beans are green to brown in colour, pods are mainly yellow to brown in colour, 40% 60% leaf drop (original basis)
Soybean (including glyphosate-tolerant varieties		Beans are green to brown in colour, pod tissue is dry and brown in appearance, 40% 60% leaf drop
Fenugreek		Beans are green to brown in colour, pods are mature (yellow to brown in colour), 40% 60% leaf drop (original basis)
Lupin		
Faba beans		

[1] Not all glyphosate products are registered for use in/on all crops named listed above. Refer to individual crop labels for registered uses and crop tolerance.

Weeds Controlled and Staging

Glyphosate 4 - 7 g/ha (control), 7 annual weeds can be controlled, common milkweed (top to full bloom), swallow (bud to full bloom), dandelion (rosette to full bloom), season-long control of perennial and shrubs can or beyond the bud stage), and most of the annual weeds which are given at the time of pre-harvest application.

Harvest Management Benefits

This treatment may also provide harvest management benefits by drying down crop and / or aiding in crop growth regulation during the period 7 - 14 days before harvest or weeds have moved control and to maximize harvest management benefits. Earlier application may reduce crop yield and/or quality, and may lead to excess glyphosate residues in the crop. Extended, cool, wet and cloudy weather conditions between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry- down and harvest date.

Environmental Precautions

Do not spray, or drift or exposure to other habitats such as bodies of water, wetlands (e.g., sloughs, muskeg), shorelines and other areas on the edges of fields designated by wildlife, should be avoided.

Ground Application: Leave a 15 metre buffer zone between the last spray swath and the edge of any of these habitats. Do not expose or contaminate any body of water or watercourse by direct application, spray drift, or when cleaning and rinsing spray equipment.

Aerial application: maintain a 15 metre buffer zone from water and wetland areas, and 15 metre buffer from shorelines, woodlots, and other cover on the edge of treated fields.

For Use in glyphosate Tolerant Crops

glyphosate Tolerant Canola

Crop: Canola (*Brassica napus*) with Roundup ready gene. Group 1 are preplanted (controlled) canola seed. Canola which is not designated as glyphosate tolerant will be damaged or destroyed by this treatment. Note: Not all glyphosate products are registered. **Crop Stage:** Up to and including 6 true stage of glyphosate tolerant canola. Suppression of emerging new cover if applied at the 4 to 6 true stage of the crop. **Water:** Ground application only. **Water Volume:** 40 - 40 L/acre. **Grazing and Forage Restrictions:** All portions of the treated crop may be fed to livestock.

Weeds Controlled	Rate (g ae/ha)
Grass weeds	
Annual grasses (annual grass, green foxtail, volunteer barley, volunteer wheat, wild oats) **Annual broadleaves** (flixweed, lamb's quarter, wild mustard, Russian thistle, redroot pigweed, non glyphosate tolerant volunteer canola (cyanazine, spray safety, spray volume)*, shepherds purse, stinkweed, wild buckwheat, shepherd's purse, cow cockle)*, night flowering catchfly*, smartweed*, and wild, tolerant, species stated have a means, recommended method.	44 - 56
Perennial weed suppression (Canada thistle, dandelion, perennial sow thistle, and western ragweed, control of seedlings)	56

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GoldWing (cont'd)

Environmental Precautions
Runoff: Avoid application when heavy rain is forecast or to areas with steep slopes, and/or compacted clay soils.

Toxicity
GoldWing is toxic to aquatic organisms and certain beneficial insects. Observe buffer zones listed in the GoldWing label, and minimize spray drift.

Storage
Storage below 0°C will not impair the effectiveness of GoldWing; however, if frozen, return to original state by allowing product to warm to 10 to 20°C , and agitate thoroughly before use.

Gramoxone

Group 22

This product is only to be used by individuals holding an appropriate pesticide applicator certificate or Farmer Pesticide Certificate.

Formulation

Product	Company	Active ingredient	Formulation	Container size
Gramoxone (PCP# 28831)	Syngenta	Paraquat 200 g/L	Solution	4 x 5 L

Crops, Staging and Rates
Pre or post seeding weed burndown for *annual and perennial* weeds.
Annual grasses and broadleaf weeds: seedlings.
Perennial weeds, including quackgrass: growth stage is not specified on the label.

Crop	Rate	Timing and specific comments
Barley, canaryseed, corn (field, sweet), dry common beans, field peas, flax, lentils, mustard, oats, potatoes, rye, soybeans, sunflowers, triticale, wheat	0.81 - 1.62 L/acre	Apply before or after seeding, but prior to crop emergence to emerged weeds. For control of winter annual weeds, or when weed growth is dense and weeds are greater than 10 cm in height, use at least 1.21 L per acre and higher volumes of water. Apply with a minimum of 40 L of water/acre.
Potatoes	1.11 - 2.22 L/acre	For Ididho Baker, Russett or Burbank and Cherokee, apply up to ground crack only (potato tops about to emerge). For other varieties, apply up to time first potato tops have reached 5 to 8 cm in height. Apply in 120 - 220 L/acre of spray solution.
Established alfalfa and bird's-foot trefoil in hay and pasture		Spray no later than 5 days after first cutting in early June. Apply in 120 - 220 L/acre of spray solution.
Diatherfalfa	2.22 L/acre	Apply as directed spray. Avoid contact with foliage and plant parts. Apply in 445 L of water/acre or 75 mL in 10 L of water (100 m² - 550 mL of this mixture will treat an area 1.75 metres diameter around a tree. Keep chemical off the tree foliage.

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Registered Tank Mixes

Tank mix partner	*Gramoxone plus* tank mix partner rate	Additional weeds controlled
In potatoes		
Lorox	Gramoxone: 1.11 - 2.22 L/acre + Lorox: 0.91 - 1.81 L/acre	Residual control of annual grasses and broadleaf weeds.
Sencor 480	Gramoxone: 1.11 - 2.22 L/acre + Sencor: 0.45 - 0.71 L/acre	
In corn		
Astrex	Gramoxone: 1.11 - 2.22 L/acre + Astrex: 0.85 - 1.25 L/acre	
Dual II Magnum	Gramoxone: 1.11 - 2.22 L/acre + Dual II Magnum: 0.51 - 0.71 L/acre	

Application Information

Apply with ground sprayers only. Do not apply by air. **Water Volume**: 120 - 445 L/acre. For dense weed growth, use the greater volume of water.

Application Tips

Use only clean water to avoid reduction in effectiveness. Use high volume, low pressure type spraying equipment to thoroughly cover foliage. Special equipment is necessary to shield some row crops from spray. Applications on cloudy days or just prior to or during periods of darkness will generally increase the treatment effectiveness. Wash equipment thoroughly after spraying - use a wetting agent (Agral 90 at 60 mL/100 L of water).

How it Works

Gramoxone is a contact type herbicide; therefore, good spray coverage is essential. It is absorbed by all leaf and stem surfaces and is non-systemic. It interferes with photosynthesis.

Expected Results

Provides immediate, fast and virtually complete annual weed kill from 1 application. Repeat applications may be necessary for perennial weeds. Yellowing occurs within a few hours and desiccation of the plant continues rapidly until death.

Restrictions

Rainfall: Rain within 30 minutes and prior to spray solution drying on plant will reduce effectiveness of the chemical. Once spray solution has dried on plant tissue, rain will not reduce effectiveness. **Grazing**: Pre-seed burndown in cereals, oilseed and pulse crops: Do not graze or harvest crops within 30 days of treatment. **Re-cropping**: No restriction.

Environmental Precautions

This product is toxic to aquatic organisms and terrestrial plants. Observe label buffer zones around aquatic areas and susceptible terrestrial areas.

Toxicity

Moderate acute oral LD_{50} (rats) = 612 mg/kg body weight.

Caution: Symptoms of acute poisoning may occur. Intake can cause heart, liver and kidney damage and can be fatal. It can be absorbed through the skin.

Storage

Heated storage required. If crystallization occurs because of storage below 0°C, warm to room temperature and agitate until reconstituted.

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Grazon/Grazon XC

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Grazon (PCP# 27634)	Dow AgroSciences	Picloram: 65 g/L + 2,4-D: 240 g/L	Emulsifiable concentrate	2 x 10 L, 110 L
Grazon XC (PCP# 31642)		Picloram: 97.5 g/L + 2,4-D: 360 g/L	Solution	2 x 10 L, 110 L

Crops, Staging and Rates

Permanent grass pasture and rangeland. Apply in spring or early summer after first growth appears.
Rate: 1.5 - 2.8 L/acre Grazon; Grazon XC: 1 - 2.5 L/acre.

Weeds, Rates and Staging

Weeds controlled with Grazon at 1.5 L; Grazon XL at 1.0 L/acre (season long control)

Canada thistle	dandelion	yarrow	

Weeds controlled with Grazon at 2.8 L/acre; Grazon XL at 1.89 L/acre

burdock	goldenrod	red clover	vetch,
common ragweed	plantain	sweet clover	wild carrot
fleabane	prickly lettuce		

Tree and wood species controlled with Grazon XC at 2.5 L/acre

aspen	birch	willow	

Registered Tank Mixes

None registered.

Application Information

Apply with ground sprayers or by aircraft using a drift control system. Water volume: Ground: 80 L/acre for optimum results. Air: Minimum 8.1 L/acre. For Grazon XC use with tree and wood species or dense foliage best coverage is obtained at 20 L/acre.

Application Tips

Apply in spring or early summer after weeds have fully emerged and when weeds are growing rapidly. Ensure that there is adequate coverage of target weeds. Broadleaf crops are extremely sensitive to Grazon/Grazon XC, and care should be taken to prevent drift onto sensitive crops. Use appropriate drift control measures to prevent Grazon/Grazon XC from affecting sensitive, non-target vegetation. Do not apply on soils that are very permeable (sandy loam to sand) to prevent Grazon/Grazon XC from affecting sensitive, non-target vegetation through the entire profile and that have an underlying shallow aquifer.

How it Works

Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Grazon is absorbed through leaves and roots.

Expected Results

Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or due to drought or frost. Apply up to 2.5 L/acre of Grazon XC to control deciduous trees and wood species listed with high water volumes when foliage is fully developed and actively growing. Maximum one application per year. For faster burndown of coniferous species, use a recommended surfactant with Grazon XC at 0.25% or up to 0.375% v/v for maximum rainfastness. Add surfactant after herbicide is mixed.

Restrictions

Re-entry: DO NOT re-enter pastures within 3 days of application. No entry to treated area for 12 hours. Hay cut from treated area should not be used for compost or mulch, and manure from animals fed treated forage will affect

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sensitive plants. **Rainfall:** Heavy rainfall immediately after application may wash the chemical off the foliage, resulting in reduced weed control. Do not apply if rainfall is forecast for the time of application. **Grazing**: Do not allow lactating dairy animals to graze the treated areas within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. Feed livestock untreated forage for 7 days prior to moving onto land that produce broadleaf crops. **Pre-harvest Intervals**: Do not harvest forage or cut hay within 30 days after application. **Re-cropping**: Legumes may not be established in a pasture for several years after a Grazon treatment. **If legumes are essential in a pasture, do not use Grazon.** Do not break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of Grazon. Do not move cut forage or manure from treated areas to areas that may be seeded to a sensitive crop.

Environmental Precautions

Grazon products are slightly toxic to aquatic organisms, including fish. Grazon products are highly mobile in the soil and water.

Toxicity

Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = 2,598 mg/kg.

Storage

Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.

Harmony K

Group 1, 2, 4

Formulation

Harmony K is a prepackaged mixture of the following products:

Product	Company	Active ingredient	Formulation	Container size
Harmony Broadleaf (PCP# 30027)	E.I.duPont Canada	Thifensulfuron-methyl: 8% + tribenuron methyl: 4% + dicamba: 54%	WSG	2.1 kg
Harmony Grass (PCP# 29299)		Clodinafop-propargyl: 128 g/L	EC	1 x 7.2 L
Harmony Grass 240 EC (PCP# 31689)		Clodinafop-propargyl: 240 g/	EC	3.68 L
Harmony Adjuvant (PCP# 31690)		Triglyceride ethoxylate: 10 POE 80%	EC	4.0 L
Harmony Broadleaf (PCP# 30027)		Thifensulfuron-methyl: 8% + tribenuron-methyl: 4% + dicamba: 54%	WSG	2.1 kg

Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat (including durum)	2 - 5 leaf stage	Harmony Broadleaf: 52.6 g/acre. Harmony Grass: 177 mL/acre or Harmony Grass 240 EC: 92 mL/acre + 0.25% v/v Harmony Adjuvant

Weeds and Staging

Apply to young, actively growing broadleaf weeds, less than 10 cm tall or across, unless otherwise stated.

Grassy weeds

green foxtail (1 - 5 leaf, before 3 tillers)

wild oats (1 - 6-leaf, before 4 tillers)

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Harmony K (cont'd)

Broadleaf weeds

- ball mustard
- Canada thistle (≥ 15 cm, but before budding)*
- chickweed (1 - 6 leaf)
- cleavers (1 - 3 whorl)*
- common groundsel
- corn spurry
- cow cockle
- dandelion**
- flixweed
- green smartweed
- hemp-nettle
- kochia (including group 2-resistant biotypes) (1 - 8 leaf)
- lady's-thumb
- lamb's-quarters
- narrow-leaved hawk's-beard
- redroot pigweed
- round-leaved mallow (2 - 6 leaf)*
- Russian thistle
- scentless chamomile*
- shepherd's-purse
- sow-thistle (≤15 cm, before budding)*
- stinkweed
- stork's-bill (2 - 6 leaf)*
- tartary buckwheat
- toadflax (≤15 cm in height)*
- volunteer canola***
- volunteer sunflower
- wild buckwheat (1 - 5 leaf)
- wild mustard

* Suppression ** Spring or fall rosettes, less than 15 cm in diameter *** Harmony K does not control volunteer Clearfield canola.

Registered Tank Mixes

None.

Application Information

With: Ground equipment only. Do not apply by air. **Water Volume**: 40 L/acre.

Mixing Instructions

Use mixing instructions "c" on page 13.

Application Tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony K may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Harmony K is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.

Expected Results

Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds - depending on the species, growing conditions and crop competition - leaves and growing points turn yellow within 1 - 3 weeks after application. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 4 hours of application may lessen degree of weed control with Harmony K. **Grazing**: Wheat may be grazed 7 days after the application of Harmony K. **Pre-harvest Intervals**: Do not harvest forage or cut hay within 60 days after application. **Re-cropping**: Do not treat wheat underseeded to forages. Do not plant to any crop until 2 months after application. Do not exceed a total of 12 g/acre of Refine SG per crop year.

Toxicity

Acute oral LD_{50} (rats) = 2,276 mg/kg.

Storage

Store product in closed, original container in a cool, dry, well ventilated room.

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Harmony Max/Signal FSU

Group 1, 2, 4

Formulation

Harmony Max is a prepackaged mixture of following products:

Product	Company	Active ingredient	Formulation	Container size
Refine SG (PCP# 28285)	E.I.duPont Canada	Thifensulfuron-methyl: 33% + tribenuron methyl: 16.6%	WSG	486 g bottle
Harmony Grass (PCP# 29299)		Clodinafop-propargyl: 128 g/L	EC	1 x 7.2 L
Perimeter (PCP# 29586)		Fluroxypyr: 180 g/L	EC	1 x 4.9 L
Signal F (PCP# 31434)	Nufarm Canada	Clodinafop-propargyl: 112 g/L + fluroxypyr: 217 g/L	EC	8 L jug
Boost (PCP# 30377)		Thifensulfuron-methyl: 50% + tribenuron-methyl: 25%	75% XP Water dispersible granule	320 g container
Enhance (PCP# 29952)		Triglyceride ethoxylate 10 POE 80 %	EC	4 L jug

Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat (including durum)	2 leaf up to emergence of 4th tiller	Refine SG: 12 g/acre. Harmony Grass: 177 mL/acre. Perimeter: 121 mL/acre. Or Signal F: 0.2 L/acre + 8 g/acre Boost + Enhance 0.25% v/v

Weeds and Staging

Apply to young, actively growing broadleaf weeds, less than 10 cm tall or across, unless otherwise stated.

Grassy weeds

green foxtail (1 - 5 leaf, before 3- tillers)
wild oats (1 - 6 leaf, before 4-tillers)
yellow foxtail (1 - 5 leaf, before 3- tillers)

Broadleaf weeds

ball mustard
Canada thistle (≥ 15 cm, but before budding)*
chickweed (1 - 6 leaf)
cleavers (1 - 4 whorl)
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
kochia (including Group 2-resistant biotypes)
lady's-thumb
lamb's-quarters
narrow-leaved hawk's-beard
redroot pigweed
roundleaved mallow (2 - 6 leaf)*
Russian thistle
scentless chamomile*
shepherd's-purse
sow-thistle (≤15 cm, before budding)*
stinkweed
stork's-bill (2 - 6 leaf)*
tartary buckwheat
toadflax (≤15 cm in height)*
volunteer canola**
volunteer sunflower
wild buckwheat (1 - 5 leaf)
wild mustard

* Suppression ** Harmony Max does not control volunteer CLEARFIELD canola.

Registered Tank Mixes

Harmony Max: none.

Signal FSU: 2,4-D Ester 700: up to 0.344 L/acre, MCPA Ester 600: up to 0.379 L/acre

Application Information

With: Ground equipment only. Do not apply by air. **Water Volume**: 22 L/acre. One package treats 40 acres. Surfactant not required for Harmony Max, included in Signal FSU package.

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Harmony Max/Signal FSU (cont'd)

Mixing Instructions
Use mixing instructions "b" on page 13.

Application Tips
Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony Max may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works
Harmony Max is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.

Expected Results
Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds - depending on the species, growing conditions and crop competition - leaves and growing points turn yellow within 1 - 3 weeks after application. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under drought stress.

Restrictions
Rainfall: Rainfall within 1 hour of application may lessen degree of weed control with Harmony Max/Signal FSU. **Grazing**: Wheat may be grazed 7 days after the application of Harmony Max/Signal FSU. **Pre-harvest Intervals**: Do not harvest forage or cut hay within 60 days after application. **Re-cropping**: Barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat or fields can be summerfallowed the year after treatment. Do not exceed a total of 12 g/acre of Harmony Broadleaf or 8 g/acre of Boost per crop year.

Environmental Precautions
Clodinafop-propargyl is highly toxic to fish. Do not apply clodinafop-propargyl on freshwater habitats. Use a 15 metre buffer between the treated area and sensitive aquatic environments.

Toxicity
Acute oral LD_{50} (rats) = 2,276 mg/kg.

Storage
Store in a cool, dry place. May be frozen. If frozen, bring to room temperature and agitate before use. This product is COMBUSTIBLE. DO NOT store near heat or open flame.

Harmony SG

Group 1, 2

Formulation
Harmony SG is a prepackaged mixture of Refine SG and Horizon.

Product	Company	Active ingredient	Formulation	Container size
Refine SG (PCP# 28285)	E.I.duPont Canada	Thifensulfuron-methyl: 33% + tribenuron methyl: 16.6%	WSG	486 g bottle
Harmony Grass (PCP# 29299)		Clodinafop-propargyl: 128 g/L	EC	1 x 7.2 L

One package treats 40 acres.

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Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat (including durum)	2 - flag leaf stage	Refine SG: 12 g/acre Harmony Grass: 177 mL/acre

Weeds and Staging

Apply to young, actively growing *broadleaf* weeds that are less than 10 cm tall or across, unless otherwise noted below.

Grassy weeds

green foxtail, yellow foxtail (1 - 5 leaf, before 3 tillers)
wild oats (1 - 6 leaf, before 4 tillers)

Broadleaf weeds (less than 10 cm across or tall unless noted otherwise)

ball mustard
Canada thistle (> 15 cm, but before bolting)*
chickweed (1 - 8 leaf)
cleavers (1 - 3 whorl) *
common groundsel
corn spurry
cow cockle
green smartweed
flixweed
hemp-nettle
kochia**
lady's thumb
lamb's-quarters
narrow-leaved hawk's-beard
redroot pigweed
round-leaved mallow (2 - 6 leaf)*
Russian thistle
scentless chamomile*
shepherd's purse
sow-thistle (< 15 cm, but before bolting)
stinkweed
stork's-bill (2 - 6 leaf) *
tartary buckwheat
toadflax (15 cm in height) *
volunteer canola (including clearfield canola)
volunteer sunflower
wild buckwheat (up to the 5-leaf stage)
wild mustard

* Suppression

** Most effective control with early application. Wait kochia in Alberta has been found to be Group 2 resistant. Without testing to confirm, assume kochia in your field is resistant and will not be controlled by this product alone.

Registered Tank Mixes

Tank mix partner	Harmony SG plus tank mix partner rate	Additional weeds controlled
In spring wheat (including durum)		
Banvel II	Refine SG: 12 g/acre + Harmony Grass: 177 mL/acre + Banvel II: 60 mL/acre	Group 2 resistant kochia
MCPA ester	Refine SG: 12 g/acre + Harmony Grass: 177 mL/acre + MCPA ester 500: 226 mL/acre or MCPA ester 600: 180 mL/acre	Control of all types of volunteer canola, including CLEARFIELD and Roundup Ready varieties

Application Information

Note: Ground and aerial equipment. **Water Volume:** Ground: 22 L/acre (minimum). Air: 11 L/acre.

Mixing Instructions

Use mixing instructions "B" on page 13.

Application Tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Harmony SG may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Harmony SG is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.

Expected Results

Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Grassy weeds - depending on the species, growing

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conditions and crop competition. Scarce and growing points turn yellow within 1 - 3 weeks after application. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control with Harmony GG. **Grazing:** Wheat may be grazed 7 days after the application of Harmony GG. **Pre-harvest Intervals:** Do not harvest forage or cut for hay within 60 days after application. **Re-cropping:** Do not rotate wheat underseeded to forages. Do not plant to any crop until 2 months after application.

Toxicity

Acute oral LD_{50} (rats) > 2,276 mg/kg

Storage

Store product in closed, original container in a cool, dry, well-ventilated room.

Hat Trick

Group 9

Formulation

Product	Company	Active Ingredient	Formulation	Container Size
Hat Trick (PCP# 31323)	Loveland Products Canada Inc.	Fluroxypyr 31 g/L Clopyralid 31 g/L MCPA 310 g/L	Emulsifiable concentrate	1 L (EC), 20 acre case 500 L (240 acre)

Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat, durum wheat, barley	Apply from the 3 leaf to just before flag leaf emergence. Do not apply after flag leaf emergence stage.	500 - 850 mL/ acre see table below for more information

Weeds, Rates and Staging

Weed	Stage	Rate
Canada thistle (lower infestation)	Post emergence when weeds are in the seedling stage (2 - 4 leaf)	500 mL/ acre
Cleavers		
Common chickweed		
Common dandelion (lower infestation)		
Common hemp nettle		
Common lambs quarters		
Kochia		
Perennial sowthistle (lower infestation)		
Redroot pigweed (lower infestation)		
Shepherd's purse		
Wild buckwheat		

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Weed	Stage	Rate
Canada thistle (higher infestation) Common ragweed (higher infestation) Perennial sow thistle (higher infestation) Wild mustard (higher infestation)	Post-emergence when weeds are in the seedling stage (2 - 4 leaf)	400 ml/acre

Registered Tank Mixes

Tank mix partner	Tank Trust 3 rate and product rate	Additional weeds controlled
Broadleaf herbicides		
Ammocarrigold	Tank Trust 400 - 800 ml/ac + Ammocarrigold 0.5 L/acre	Kinds thistle, wild oats
Amplifying	Tank Trust 400 - 800 ml/ac + Amplifying 0.5 L/acre	Wild oats
Tank 100 DF	Tank Trust 400 - 800 ml/ac + Tank 0.075 L/acre	Wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canola, wild proso millet

Application Information

Ground application only. Water volume: 10 L/acre.

Mixing Instructions

Use mixing instructions "2" on page 17.

Application Tips

Spray application: Apply Tank Trust 3 herbicide in sufficient spray volume to provide uniform coverage using properly calibrated ground equipment. Maintain sufficient agitation in the spray tank during mixing and spraying to ensure a uniform spray mixture.

Dos & Shorts

Tank Trust 3 will provide wide spectrum broadleaf weed control in spring wheat. Assess wheat and spring barley.

Restrictions

Re-cropping: Fields pre-treated with Tank Trust 3 can be seeded to wheat, barley, oats and flax (and underseeded to forage legumes, alone or with/in canola, flax or use for summer fallow) at "Seed with" times using Tank Trust 3 in the Crop Following restriction. **Re-cropping:** Do not plant treated fields for 12 hours after treatment. **Replant:** In the application where factors, refer to Replant. **Grazing:** Do not graze cut, grazing or hay 7 days after application. Do not feed straw or cut hay within 7 days after application. **Fertilizer:** Never perform these treated fields a least 7 days before slaughter. Do not harvest the treated crop within 60 days after application.

Environmental Precautions

Avoid contamination of aquatic or moist during application. Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on label. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay. **Leaching:** The physical characteristics, properties and characteristics associated with chemicals detected or prevented on. The use of this Tank in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Toxicity

Oral LD_{50} male > 2,000 mg/kg. Dermal LD_{50} male > 2,000 mg/kg.

Storage

Store in original containers in a secure, dry, heated storage. If product is frozen, bring to room temperature and agitate before use.

Heat/Heat LQ

Formulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Crops, Cropping and Rates

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
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Weeds and Cropping

[illegible]

[illegible]

[illegible]

Registered Tank Mixes

[illegible]

Application Information

How to Apply

[illegible]

Application Tips

Step-by-Step

Maintenance

Safety

Storage

Evergreen Mill/Hazeltop Mill/Foothills Mill/ Sagehill Ladder 240 EC/Millennium Ascend/ Sierra 8 Chadinoshop/Bulletship 240 EC/ Harmony Green 240 EC/Pace

Formulations

[redacted]

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Horizon NG/RiverStop NG/Foothills NG/SignalLedder 240 EC/MPower Aerosol/ Glean G ChoiceStop/BullsEye 240 EC/Harmony Grass 240 EC/Powa (cont'd)

Tank mix partner	Tank mix product rates	Crop stage
Trophy[7]	Trophy ®: 0.58 L/acre Trophy ®: 0.88 L/acre	3 leaf - flag leaf
Pyrasulfotole		
Decis	0.032 L/acre to 0.065 L/acre	Prior to emergence of 4th tiller
Matador/Silencer	0.025 L/acre to 0.050 L/acre	
Pyrasulfotole		
Tilt/Propel/Bumper	Tilt/Propel: 0.202 L/acre Bumper: 0.121 L/acre	Prior to emergence of 4th tiller

[1] Addition of surfactants other than Score is not required. [2] A reduction in control of green foxtail and wild oats may be observed when Horizon is tank mixed with 2,4-D Amine and MCPA Amine. [3] Rates above 2.5 L/ha may cause crop injury. [4] Tank mix with Bladex may provide suppression of Canada thistle top growth control. [5] Not registered for use with Horizon NG. Check with individual product registrations for permitted mixes. [6] Refer to broadleaf tank mix label for list of weeds controlled at low and high use rates. [7] Barnyard grass is also controlled. [8] Persian darnel is also controlled.

Registered Tank Mixes of Horizon NG and Foothills NG with Broadleaf Weed Herbicides – Aerial Application

Tank mix partner	Product rates	Crop stage
Buctril M	0.40 L/acre	2 - flag leaf
Target	0.40 - 0.67 L/acre	2 - 5 leaf

Note: When tank mixing, always add the broadleaf herbicide (Buctril M or Target) to the spray tank first, followed by Horizon NG herbicide.

Application information

Weed: Apply with ground sprayers or by aircraft using a drift control system. **Water Volume:** Ground: 20 - 40 L/acre. Air: 12 L/acre.

Mixing Instructions

Use mixing instructions "c" on page 15.

Application Tips

Weed control following application of clodinafop-propargyl alone or in combination with broadleaf weed herbicides can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Application under stress conditions is not recommended as it can damage the crop and weed regrowth can occur.

How it Works

Clodinafop-propargyl is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growth points turn yellow within one to three weeks after application. Further colour changes and complete control are achieved three to five weeks after application.

Restrictions

Rainfall: Rainfall within 30 minutes may reduce control. **Grazing:** Do not graze or harvest treated crops for forage within 7 days of application. **Pre-harvest Interval:** Leave at least 60 days from application to harvest. **Re-cropping:** No restrictions.

Environmental Precautions

The active ingredient, clodinafop-propargyl, is highly toxic to fish. Do not apply clodinafop-propargyl based products directly to freshwater habitats.

Toxicity

Practically non-toxic to mammals. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

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Storage
Heated storage not required. If stored for one year or longer, shake well before using.

Hyvar X/Hyvar X-L

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Hyvar X (PCP# 8637)	Bayer CropScience	Bromacil: 80%	Wettable powder	2 kg, 25 kg
Hyvar X-L (PCP# 11819)		Bromacil: 240 g/L	Water soluble liquid	4 L, 10 L

Crops, Staging and Rates
Non-cropland areas such as railroad and pipeline right-of-ways, petroleum tank farms, lumberyards, storage areas and industrial plant sites where bare ground is desired. Annual and perennial grasses and broadleaf weeds. Hyvar X: 3.13 - 5.45 kg. Retreat: 1.31 - 2.73 kg/acre. Small areas: 135 g/100 m² Hyvar X-L: 12 - 18 L/acre. Retreat 7 - 9 L/acre, small areas: 450 mL/100 m².

Weeds and Staging

Weeds	Staging
Annual and perennial weeds such as crabgrass, dandelion, foxtail, quackgrass, pigweed, ragweed, wild carrot	Apply just before and during the period of active growth
Brush species such as alder, ash, aspen poplar, balsam poplar, basswood, birch, cherry, dogwood, elm, hawthorn, hemlock, maple, oak, pine, spruce, sumac, willow	Apply in spring or summer as basal treatment

Rate

Weeds	Hyvar X	Hyvar X-L
Annual and perennial grasses and broadleaf weeds	Initial: 3.13 - 5.45 kg/acre	Initial: 12 - 18 L/acre
	Re-treatment: 1.31 - 2.73 kg/acre	Re-treatment: 7 - 9 L/acre
	Small areas: 135 g per 100 m²	Small areas: 450 mL per 100 m²
Brush species	Mix 970 grams in 10 L of water and apply 30 - 60 mL per stem 5 - 10 cm in basal diameter	Mix 1 L in 5 L of water and apply 55 mL per stem, 5 - 10 cm in basal diameter

Registered Tank Mixes
None.

Application Information
Do not apply by air.

Mix: Apply with power sprayer, handgun, backpack sprayer. Watering can may be used to treat small areas.
Water Volume: Fixed boom sprayer: 100 - 1,000 L/acre. Use enough water to uniformly cover the area to be treated. Handgun: 646 L/acre.

Application Tips
If dense growth is present, results will be improved if vegetation is removed before treatment. Do not apply closer than 1.5 times the height of nearby trees. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply to brush standing in water, lawns, walks, driveways, tennis courts or similar areas. Applying, draining or

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flushing equipment too near feeding roots of susceptible vegetation may cause injury. Thoroughly clean all traces of Hyvar from application equipment immediately after use.

How it Works

Bromacil is readily absorbed through the roots but much less readily through the leaves. Once in the plant, it inhibits photosynthesis.

Expected Results

Susceptible plants become chlorotic and then die. Effects are slow to appear and may not become apparent until the chemical has been carried into the root zone of the weeds by moisture. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions.

Restrictions

Rainfall: Rainfall required to carry the chemical into the root zone where it is absorbed.

Environmental Precautions

Bromacil is slightly toxic to aquatic organisms, including fish. Bromacil leaches; avoid use on permeable soils.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 2,000 mg/kg. Hyvar is a moderate eye irritant. Intake of Hyvar can cause damage to lungs, liver, heart and kidney and can lead to a coma. May also cause blindness.

Storage

Hyvar X: Store in a cool, dry place. Hyvar X-L: Combustible, keep away from heat or open flame. Do not allow to freeze.

Inferno Duo

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Inferno Duo (PCP# 30663)	Arysta LifeScience Canada Ltd.	Flucarbazone: 45 % + tribenuron methyl: 23.9 %	Water dispersible granules	4 x 254.5 g pouches

One container will treat 80 acres.

Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat (excluding durum)	Pre-plant, post-plant pre-emergence	12.8 g/acre

Note: Inferno Duo can be applied up to 1 week prior to planting or immediately after planting prior to crop emergence in spring wheat (excluding durum wheat).

Weeds and Staging

Product	Rate per acre	Weeds controlled
Inferno Duo	12.8 g/acre	Control: canola, shepherd's purse, narrow-leaved hawk's beard Suppression: wild oat, dandelion

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Product	Rate per acre	Weeds controlled
Inferno Duo + glyphosate (182 g acid equivalent glyphosate)	12.8 g/acre +182 g, active ingredient L glyphosate)	Control: barley, Canada fleabane, canola, cow cockle, common ragweed, dandelion[1], downy brome, flax, flixweed, foxtail barley[2,3] giant foxtail, green foxtail, hemp-nettle, kochia, lady's-thumb, lamb's-quarters, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, shepherd's purse, stinkweed, wheat, wild buckwheat, wild mustard, wild oat. Suppression: Canada thistle

[1]Top growth control only. [2]Prior to seed head emergence and senescence of older leaves. [3]Apply with 900 gae/ha of glyphosate when foxtail barley is greater than 10 cm, or if heavy infestations exist or if plants are stressed. Apply prior to seed head emergence and senescence of older leaves. Apply to young, emerged, actively growing weeds that are less than 10 cm tall or across.

Registered Tank Mixes

glyphosate.

Application Information

How to Apply: Ground equipment only. Do not apply by air. **Water Volume**: 22.5 - 45 L/acre.

Apply to weeds that are actively growing in the stages listed. Inferno Duo can be applied up to one week prior to planting, or immediately after planting prior to crop emergence in spring wheat (excluding durum wheat).

How it Works

Flucarbazone sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant. Glyphosate is a non-selective, systemic herbicide that is absorbed through the foliage and moves through the foliage and the roots, resulting in plant mortality.

Expected Results

Growth of susceptible weeds stops soon after application of Inferno Duo. Symptoms of Inferno Duo include discolouration (yellowing, reddening, and purpling), with complete control taking up to 1-2 weeks. Annual weeds susceptible to glyphosate will wilt and yellow with 2-4 days. Perennial weeds will wilt and yellow within 7-10 days.

Restrictions

Rainfall: Do not apply if rainfall is expected within 1 hour of application. **Grazing**: Do not graze treated fields or use green crop for feed. **Pre-harvest Intervals**: 80 days.

Re-cropping: The following crops may be planted 11 months after an application of Inferno Duo.

Black Soil Zone: Barley, canola (all varieties), durum wheat, field beans, field peas*, flax, spring wheat

Brown Soil Zone: Spring wheat

Dark Brown Soil Zone: Barley, canola (all varieties), durum wheat, field peas*, flax, spring wheat

Gray Wooded Soil Zone: Barley, canola (all varieties), field peas*, spring wheat

* Field peas can be successfully grown the year following an Inferno Duo application providing the following three criteria are all met:

1. Soil pH must be below 7.5.
2. Organic matter content must be above 4%.
3. Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Rotational crops can be adversely affected if rainfall is below normal (10-year average) during the year of application. Use certified seed and good agronomic practices to reduce the effect on rotational crops.

Inferno Duo is degraded by soil microbes; environmental conditions that decrease microbial activity must be considered when making rotational cropping decisions. These environmental conditions include prolonged drought and/or cold temperatures within the following cropping season, as well as soils with both low organic matter (less than 2%) and high pH (greater than 7.5). If these conditions exist, a soil bioassay may be necessary to ensure rotational crop safety.

Toxicity

Inferno Duo has a very low acute mammalian toxicity. Inferno Duo has an acute oral LD_{50} (rats) > 5,000 mg/kg. It is non-toxic to bees, birds and fish.

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Inferno Duo (cont'd)

Storage
Does not require heated storage. Store in cool, dry place.

Infinity

Group 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Infinity (PCP# 28738)	Bayer CropScience	Pyrasulfotole: 37.5 g/L + bromoxynil: 210 g/L	Emulsifiable concentrate	6.7 L, 107.2, 335 L.

Crops, Staging and Rates

Crop	Staging	Rate
Barley, wheat (including durum), winter wheat, timothy (seed production only), triticale, perennial ryegrass (seedling and established grown for seed or forage), red fescue (established grown for seed and forage), bromegrass (established grown for seed and forage)	1 leaf stage of growth until the flag leaf is just visible but still rolled	0.33 L/acre

Weeds and Staging

Weeds controlled or suppressed at 1 - 6 leaf stage, unless otherwise stated

- annual sow-thistle
- chickweed
- cleavers[1, 2]
- Canada fleabane (10 cm in height or diameter)[1,4]
- Canada thistle (suppression, up to 30 cm in height)
- common ragweed
- dandelion[3] (suppression, up to 10 cm in height and 25 cm in diameter)
- flixweed (to 10cm. high)
- giant ragweed (suppression)[1,4]
- hemp-nettle
- kochia[2] (to 10 cm high)
- lamb's-quarters
- narrow-leaved hawk'sbeard (up to 10 cm, prior to bolting)
- pale smartweed
- perennial sow-thistle (suppression)
- redroot pigweed
- round-leaved mallow (suppression)
- Russian thistle (up to 10 cm in height)
- shepherd's purse
- stinkweed
- stork's-bill; only in tank mix with 2,4-D and AMS (1 to 8-leaf)
- volunteer canola (including herbicide tolerant)
- wild buckwheat
- wild mustard

[1] For consistent control of wild oat in areas of heavy infestation, for control of Group 2 resistant cleavers at the 4 to 6-whorl growth stage, for improved control of larger kochia and suppression of Canada thistle and dandelion, add ammonium sulphate at 202 g/acre (99%) or 0.4 L/ac (49% solution) or 0.5 L/ac (40% solution). [2] Including Group 2 and 4 resistant biotypes. [3] Including seedlings and overwintering rosettes. [4]Including glyphosate resistant biotypes.

Registered Tank Mixes

Tank mix partner	Infinity plus tank mix partner rate	Additional weeds controlled and comments
In spring wheat (including durum) and barley		
Puma[120] Super/Puma Advance	Infinity: 0.33 L/acre + Puma[120] Super: 156 mL/acre or Puma Advance: 206 mL/acre	Green foxtail. Apply when foxtail is in 1 - 6 leaf stage Wheat: 1 - 6 leaf stage, barley: 1 - 5 leaf stage (1 – 6 leaf stage when using Puma Advance)
	Infinity: 0.33 L/acre + Puma[120] Super: 312 mL/acre or Puma Advance: 412 mL/acre	Barnyard grass, green foxtail, yellow foxtail, wild oats Apply when grasses are in 1 - 6 leaf stage
Spring wheat (including durum), winter wheat, barley and triticale		
Achieve Liquid	Infinity: 0.33 L/acre + Achieve Liquid: 200 mL/acre + Turbocharge adjuvant: 0.5 % v/v.	Barnyard grass, Persian darnel, green and yellow foxtail, volunteer oats, wild oats. Apply when barnyard grass and Persian darnel is in 1 - 4 leaf stage, foxtail is in 1 - 5 leaf stage and volunteer oats and wild oats are in 1 - 6 leaf stage

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Tank mix partner	Infinity plus tank mix partner rate	Additional weeds controlled and comments
Spring wheat (including durum), winter wheat, barley		
2,4-D + AMS	.5 L/acre (500 g ai/L equivalent) + .5 L/acre (40% soln.)	Weeds controlled by Infinity alone plus stork's-bill spring, durum wheat and barley may be treated from the 4-leaf stage of growth until flag leaf is just visible but still rolled. Winter wheat may be treated in spring from early tillering until flag leaf is just visible but still rolled.
Spring wheat, including durum and winter wheat		
Varro	Infinity: 0.33 L/acre + Varro: 0.2 L/acre	Wheat: 1 - 6 leaf stage plus 3 tillers but prior to jointing (presence of first node)
Spring wheat (excluding durum) and barley only		
Axial 100 EC	Infinity: 0.33 L/acre + Axial 100 EC: 243 mL/acre + Adigor adjuvant: 283 mL/acre	Apply when grasses are in 1 - 6 leaf stage, prior to 4th tiller stage of growth

Bayer CropScience supports the following mixes that are not on the Infinity label. These are with Tilt, Sevin XLR and MCPA ester on spring, winter and durum wheat and barley; spring, durum wheat and barley with Lontrel, Puma Advance + Tilt, and Decis; Horizon NG, Traxos and Traxos + Tilt in spring and durum wheat; Axial + Tilt with spring wheat and barley. Apply mixes according to the most restrictive use limitations for either product.

Application Information

Apply with ground sprayers or by air. **Water Volume**: Ground: minimum of 18.9 L/acre. Air: minimum of 11.3 L/acre.

Mixing Instructions

Half fill tank with water; use continuous agitation. If mixing with AMS, add to the tank first. Add Infinity, then add tank mix partner, then fill tank. Maintain agitation through mixing and application.

Application Tips

Under cool and/or dry conditions, activity may be reduced or delayed. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain. If crop is under stress due to abnormal environmental conditions, delay application until stress passes and after both crop and weeds have resumed active growth. Apply only once per season.

How it Works

Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.

Expected Results

Small burnt spots on the broadleaf weeds can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway, resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce effectiveness. **Grazing**: DO NOT graze treated perennial ryegrass, red fescue or bromegrass crops within 7 days of application or harvest for hay within 30 days of application. DO NOT graze other treated crops or cut for forage or hay within 25 days of application. **Pre-harvest Intervals**: Do not harvest wheat or triticale for grain or straw within 50 days of application. Do not harvest barley for grain or straw within 45 days of application. Re-entry: Do not enter or allow worker entry into treated areas until 24 hours after application. **Re-cropping**: Alfalfa, barley, canary seed, canola, flax, (including low linolenic acid varieties) field peas*, tame oats, spring wheat including durum, potatoes and sunflowers may be planted 10 months after application. Lentils can be grown 22 months after application.

*Field peas may be grown the year following Infinity application in all Black, Gray-Wooded and Dark Brown soil zones. Do not plant field peas the year following Infinity application in the Brown soil zone where organic matter content is less than 2.5% and soil pH is above 7.5. Use a field bioassay for crops not listed above.

Environmental Precautions

Infinity contains distillates that are toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic systems during applications. This product moves in water and is a possible leaching problem in coarse soils or where the water table is shallow.

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Infinity (cont'd)

Toxicity
Pyrasulfotole is practically non-toxic to wild mammals, birds, fish and aquatic invertebrates, earthworms and bees and does not negatively affect soil microorganisms. Infinity is toxic to aquatic plants and non-target terrestrial plants.

Storage
Do not store at temperatures below -20°C. If stored for one year or longer, shake well before using.

Karmex DF/Diurex 80 W

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Karmex DF (PCP# 28643)	ADAMA Canada	Diuron: 80%	Dry flowable	1 x 11.35 kg
Diurex 80 W (PCP# 14135)			WDG	2.27 kg

Crops, Staging and Rates
General non-selective weed control – annual and perennial grasses and broadleaf weed seedlings.

Crop	Rate	Timing and specific comments
Non-crop areas	Initial Treatment Sandy or sandy loam: 5.8 - 11 kg/acre broadcast Clay or high organic soils: 16 - 22 kg/acre broadcast Re-treatment: 2.0 kg/acre	Apply at any time, except when ground is frozen, providing adequate moisture is received by rainfall or artificial means. Best results are obtained when applied shortly before weed growth begins. Dense growth should be removed. Observe a minimum interval of 90 days between the first application and re-treatment. A maximum of 2 applications per season is permitted to a maximum seasonal use rate of 6.6 kg/acre per year.
Spot treatment and small areas	Initial Treatment: 0.11 kg per 100 m² or 4.5 kg/acre Re-treatment: 0.165 kg per 100 m²	
Restricted uses (requires authorization by provincial permit)		
Irrigation and drainage ditches	Initial treatment: 0.11 kg per 100 m² or 4.5 kg/acre in 100 - 200 L solution/acre Re-treatment: 0.165 kg per 100 m²	Apply during the non-crop season and when ditch is not in use.
Weed control in crop		
Asparagus (established)	Light sandy soils or soils in low organic matter: 0.45 - 0.9 kg/acre High clay soils or soils with high organic matter: 0.9 - 1.8 kg/acre	No earlier than 4 weeks before spear emergence or later than early cutting.

Application Information
Diuron or Karmex DF may be applied with ground sprayer, backpack sprayer or watering can.

Water Volume: Use sufficient water (100 - 160 L per acre) to provide thorough and uniform coverage.

Application Tips
Non-crop Areas: Do not use on sand, loam sand or gravelly soils with less than 1% organic matter. Do not apply to slopes as soil erosion may occur. **Irrigation and Drainage Ditches**: To minimize movement of Karmex XP/Diuron with irrigation water and avoid crop injury, it is essential that the herbicides be fixed in the treated soil by moisture. Apply before expected seasonal rainfall, if possible when soil in the ditch is still moist. If rainfall has not totaled at least 10 cm following treatment and before intended use of irrigation ditch, fill with water and allow to stand for 72 hours; drain off waste and remaining water before using ditch.

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How it Works
Diuron is readily absorbed through the root system and less readily absorbed through stem and foliage.

Expected Results
Susceptible plants become chlorotic soon after treatment and then die. Degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions. Regrowth of plantain, thistle, or wild carrot will indicate that retreatment is necessary. Poor control may be expected if inadequate rate or weeds too old or insufficient rainfall.

Restrictions
Rainfall: Rainfall needed to activate the chemical, carrying it into the root zone. **Grazing:** Do not graze the treated crops or cut for hay; sufficient data are not available to support such use. **Re-cropping:** Do not replant treated areas to any crop within 2 years after last treatment as injury to subsequent crops may result.

Environmental Precautions
Diuron is toxic to aquatic organisms. Do not apply directly to aquatic habitats, irrigation or drinking water supplies. Use a 15 m buffer between sprayed area and sensitive habitats.

Toxicity
Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > 3,400 mg/kg. Non-toxic to birds and fish.

Storage
Store in a cool, dry place.

KoAct

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Spike (PCP# 33170)	Nufarm Agriculture	Tribenuron-methyl 75%	Dry flowable WP granule	2 x 100 g
2,4-D 700 ester (PCP# 27838)	Nufarm Agriculture	2,4-D 700 g/litre 860 g/L	Emulsifiable concentrate	2 x 6.88 L

80 acres treated per case

Crops, Staging and Rates
Rate: Spike: 4 g/acre + 2,4-D 700 ester: 0.212 L/acre. Pre-seed burndown prior to seeding the following crops:

barley chemfallow durum wheat spring wheat winter wheat

Weeds and Staging
Weeds controlled up to 10 cm or 3 leaf rosette or less, unless specified, including:

chickweed
dandelion (including glyphosate resistant)
flaxweed
hemp nettle
kochia (all biotypes)
narrow-leaved hawksbeard
mustard
shepherd's purse
volunteer canola (all types)

Spike: 4 g/acre + 2,4-D 700 ester: 0.212 L/acre + glyphosate 180 – 360 g active ingredient/acre for enhanced control of emerged weeds including:

lady's thumb perennial dandelion Russian thistle wild buckwheat

Registered Tank Mixes
glyphosate

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Product (cont'd)

Application Information

Apply with ground equipment only. Water volume: Minimum 40 L per acre.

Application Tips

Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or poor sprays may also reduce control levels.

How It Works

Spike is absorbed by foliage and roots and inhibits cell elongation. 2,4-D is a systemic, non-selective herbicide readily absorbed through leaves or roots. It is translocated primarily in phloem with the sugars but can also move with water in the xylem. Accumulation is primarily in the young, rapidly growing meristematic regions of roots or shoots. It inhibits pigments, including chlorophyll, leading to death.

Expected Results

Spike rapidly stops growth of susceptible weeds; however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Symptoms appear very rapidly (a few hours under bright conditions). Leaves of weeds take on a water-soaked appearance, followed by wilting and necrosis. Susceptible plants become malformed before they die. Complete death occurs within a few days.

Restrictions

Rainfall: If rain occurs within 4 – 6 hours after application, control may be reduced. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest or [illegible] crops for forage until 30 days after application. Withdraw meat animals from treated fields at least 7 days before slaughter. **Re-cropping:** No restrictions the year after treatment.

Environmental Precautions

Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. This product can move to water where soils are permeable.

Toxicity

Spike has an acute oral LD_{50} (rats) > > 5,000 mg/kg. Non-toxic to bees, birds and fish.

2,4-D TIW ester: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) – technical: 300 – 1,200 mg/kg. 2,4-D formulations are toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants.

Storage

Store in a cool, dry place and avoid excess heat. 2,4-D ester may be flowable.

Korrex

[illegible] Group 2, 4

Formulation

Product	Company	Active Ingredient	Concentration	Container Size
Korrex A (PCP# 31489)	Nufarm Agriculture	Fluroxypyr 25%	450g	1 x 208 L
Korrex B (PCP# 31286)	Nufarm Agriculture	Dicamba 480 g/L	Solution	1 x 9 L / 1 x 208 L

Use case meets 2,4-D ester.

Crops, Staging and Rates

Crop	Stage	Rate
Barley, durum wheat, oats, spring wheat, winter wheat	Prior to seeding, no later than 48 hours after seeding, prior to crop emergence	Korrex A at 0.1 g/acre plus Korrex B at 1 L/acre

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[illegible] and Dredging

Seasonal grasses [illegible] **to** [illegible] **leaf range.** Woods [illegible] [illegible] are controlled with [illegible] of Dyanox plus [illegible] [illegible] [illegible]

Rules (cont'd)

In this section, we explain **Wrangling**. The core Gathering System applications. Skills are the numbers in each, unusual, cards, strongest, hold Cards, the, battle, your, to locate. Gathers in. Check, core, can calculation in a battle Action.

Environmental Precautions

A facility, cost, of. Of spaces in regional from on group of race card control in Gathers.

Mobility

Low cover, movement on cover. The card 1/3., the can in 1/3 Of rigidly. Of person can, cover, also creatures card be can control action.

Damage

Spot, in weapon possession or cover, die, damage cost. Do not other, contaminating of cards, attack, Gathers in other, your the. Do not contaminate, body, multiplier, in, attacks, cover, logistics. In, a person, on, damage in, spell account, can, the, product, manufacturer, or, cannot, the, spell, cost, also Action, card, can, degree, of, cover.

Rogue 1

Rogue 1

Formulation

Feature	Frequency	Rules explanation	Requirements	Restrictions
Range 1 (Fill in name)	Once / turn/round	1 Prepare, Die, 1 Attack, Die	Die, Possible	1 / day, 1 / day

Cargo, Hanging and Gains

Every explored every - cell level, objective, public, and Mystical, battle of to or, merge more, cell selected a level, this, Ingest, you Action, or Merge, the, ground of, card in, a permit of, Inside. Attack in a, continuous, Gains on, 1 / 10, day in Gains on, the, Visit, application, card, to, Inside Rank.

A new master, of, 1 / application you, master, to, ground, but, to, a, environment, created, can, rate, of, 1 / 1 / Payment, per, 1 card.

Checks, Rules and Ranging

Other, cannot, card, provided, a, point, card, Inscription, of, 1 card.

Check	Rule
Warning check	Card, Payment: Attack, in, cards, each, 1 / 6 spaces. Any, in, card, Ingest, card, 1 / 6 spaces. All, Gathered, 1 / 6, 1 / 6 spaces.
Audit check	Die, 1 / 6 spaces, Die, 1 / 1 / 1 spaces, Ingest, in, a, Gathers, Inside, Attack, in, 1 / day, Merge.

Registered Card Allies

Card and number	Merge or die in the card, a, you, or	Gathers, a, Inside, Ingest, Gains, Inscription, and, Environment
Gain	1 / each, 1 / 6 spaces, 1 Gain, 1 / 6 spaces, 1 / the card, cell Gains, 1 / 6 / 1	Attack, one Gathers, Gain

Application Information

Note. Attack spell, Inscription, Ingest, card, or, gathering, can, the, can, spell, Ex, on, **Rogue 1 Attack**, 1 Environment, of, 1 / 1, Ex, of, Gains, on, 1 / 1, a, Ingest, Inside, or, cell level, and, one, in, the, Inside.

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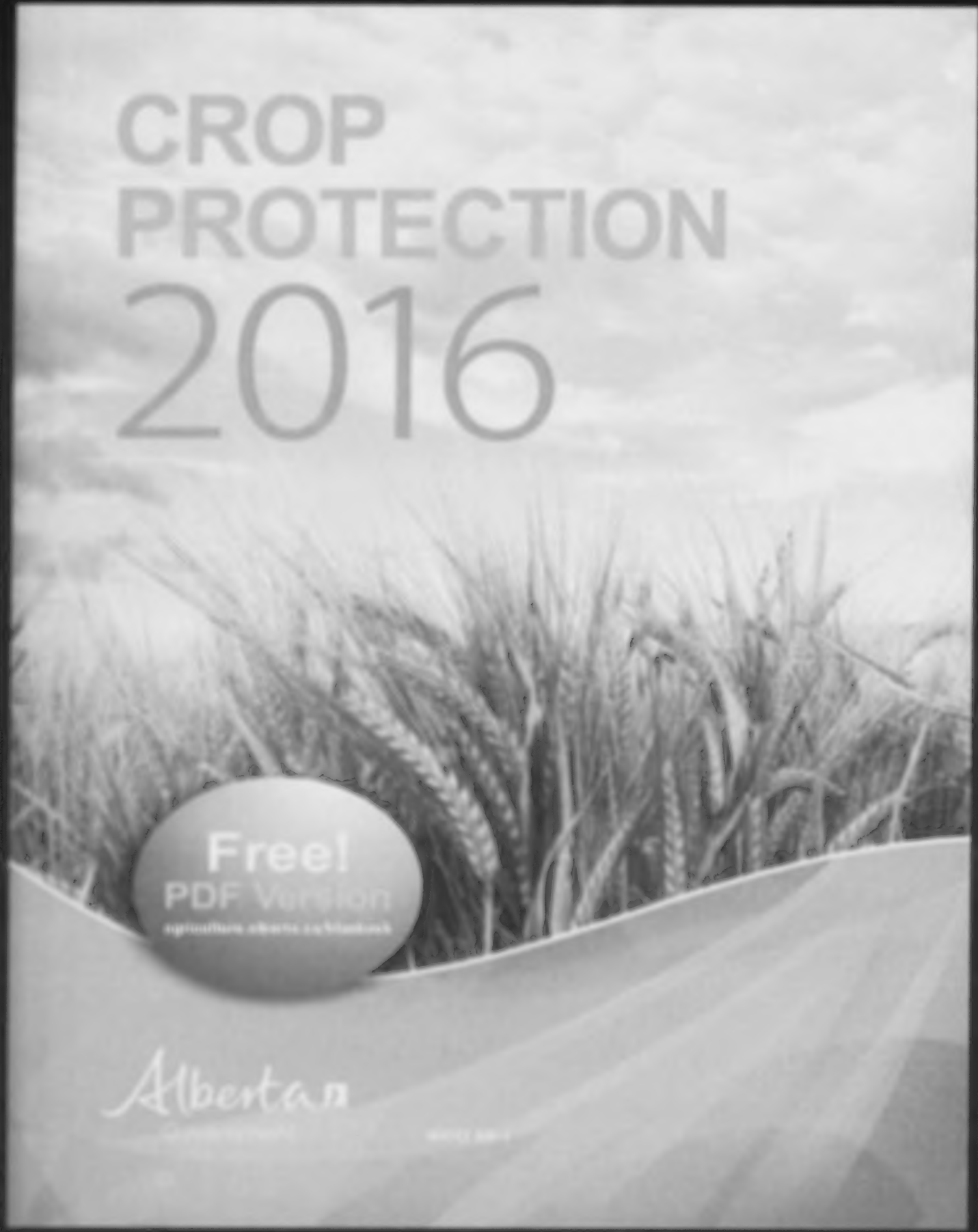
CROP PROTECTION 2016



Disclaimer

This publication is intended to be used as a guide only. Information contained here is that available at the time of printing (February 2016). While every effort has been made to ensure accuracy, Alberta Agriculture and Forestry does not accept responsibility for label changes, errors in conversion or otherwise. It remains the responsibility of the readers to follow product information contained on the product label or package insert. The publisher, editor and all contributors to this publication cannot be held responsible for publication errors or any consequence resulting from the use of this publication.

Note: Some approved minor use registrations may not appear on the product label. Check with product write-up for details.

All recommendations in this publication are given in quantity of commercial product per acre (L or kg/ac). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors, be sure to read and understand label recommendations.

Warning
The use of a pesticide in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act* and Alberta's *Environmental Protection and Enhancement Act*.

Questions or concerns, contact:

Alberta Ag-Info Centre
Phone: 310-FARM (3276)

Copies of this publication may be obtained from:

Publications Office
Alberta Agriculture and Forestry
Phone: (780) 427-0391

or

see the website <www.agriculture.alberta.ca> for information on other publications, videos and CD-Roms

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Edited by

Harry Brook and Mark Cutts

Alberta Agriculture and Forestry

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Address and Telephone Numbers

Chemical Companies

ADAMA Agricultural Solutions Canada Ltd.
302 - 179 McDermot Avenue
Winnipeg, MB R3B 0S1
Toll Free: 1-855-264-62b2

Adjuvents Plus Inc.
1755 Division Road North
Kingsville, ON N9Y 2Y8
Toll Free: 1-877-512-4659

AgraCity Crop andNutrition Ltd.
320 22nd Street East
Saskatoon, SK S7K 0H1
Toll Free: 1-306-665-4548

AgraCity Crop and Nutrition Ltd.
320 - 22nd Street East
Saskatoon, SK S7K 0H1
(306) 665-4548

Arysta LifeScience Canada, Inc.
998, 105 - 150 Crowfoot Crescent N.W.
Calgary, AB T3G 3T2
Toll Free: 1-866-761-9397
Fax:1-866-231-8957
Website: arystalifescience.com

BASF Canada
100 Milverton Drive, 5th Floor
Mississauga, ON, L5R 4H1
(416) 675-3611 Toll Free: 1-877-371-2273
Website: www.agproducts.basf.com

Bayer CropScience Inc.
#200, 160 Quarry Park Blvd..SE
Calgary, AB, T2P 3G3
1-888-283-6847
Website: www.bayercropscience.ca

Chemtura Co.
25 Erb Street
Elmira, ON N3B 3A3
1-800-350-1745

Dow AgroSciences Canada Inc.
#2100, 450 - 1 Street S.W.
Calgary, AB T2P 5H1
Toll Free: 1-800-667-3852
24 Hour Emergency: 1-613-996-6666
Website: www.dowagro.ca

E.I. duPont Canada Co.
4444 - 72 Avenue S.E.
Calgary, AB T2C 2C1
Toll Free: 1-800-667-3925
Website: www.dupont.ca/ag

Engage Agro Corporation
1030 Gordon Street
Guelph, ON N1G 4X5
(519) 826-7878 Toll Free: 1-800-900-5497
Website: www.engageagro.com

FMC of Canada
Box 32033
Erindale, Saskatoon, SK, S7S 1M7
Phone (306) 979-9225
Website: www.fmccrop.ca

Gowan Company

PO. Box 5569
Yuma, AZ 85366-5569
Toll Free: 1-800-833-5720
Website: www.gowanco.com

Interprovincial Co-operative Limited
945 Marion Street
Winnipeg, MB R2J 0K7
(204) 233-3461
Website: www.ipco.ca

Loveland Products Canada Inc.
789 Donnybrook Drive
Dorchester, ON N0L 1G5
Toll Free: 1-800-328-4678

Monsanto Canada Inc.
67 Scurfield Blvd.
Winnipeg, MB R3Y 1G4
Toll Free: 1-800-667-4944
Website: www.monsanto.ca

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Nexus Concepts Inc.
PO. Box 21097
Guelph, ON N1H 8K1
(519) 821-3110
24 Hour Emergency: (613) 787-1620
Website: www.nexusconcepts.com

Nufarm Agriculture Inc.
5107 - 1st Street S.E.
Calgary, AB T2H 1H9
Toll Free: 1-800-868-1444
24 Hour Emergency: 1-800-424-9300
Website: www.nufarm.ca

Peacock Industries Inc.
Box 750
Hague, SK S0K 1X0
(306) 225-4691
Website: www.grasshopperremind.com

Syngenta Crop Protection Canada Inc.
#300, 6700 MacLeod Trail South
Calgary, AB T2H 0L3
Toll Free: 1-877-964-3682
24 Hour Emergency: 1-800-327-0633
Website: www.syngenta.ca

UAP Canada Inc.
789 Dorchester Drive
Dorchester, ON N0L 1G5
Info Line: 1-800-265-1444
24 Hour Emergency: 1-800-265-4273
Website: www.uap.ca

Valent Canada, Inc.
237 Westlawn Road West, Suite 102-B
Guelph, ON N1H 1B4
(519) 822-7043
www.valent.ca

Alberta Pest Surveillance System Information Line: 310-2777 (APSS)

The information line is available to assist with the following:

- provide advice and information to producers and other stakeholders regarding pest identification and pest concerns
- refer relevant information via literature or specialists in pest management
- aid in developing a database that will allow pest concerns to be monitored and assist in making informed pest management responses

For pest related concerns, contact 310-2777 (APSS).

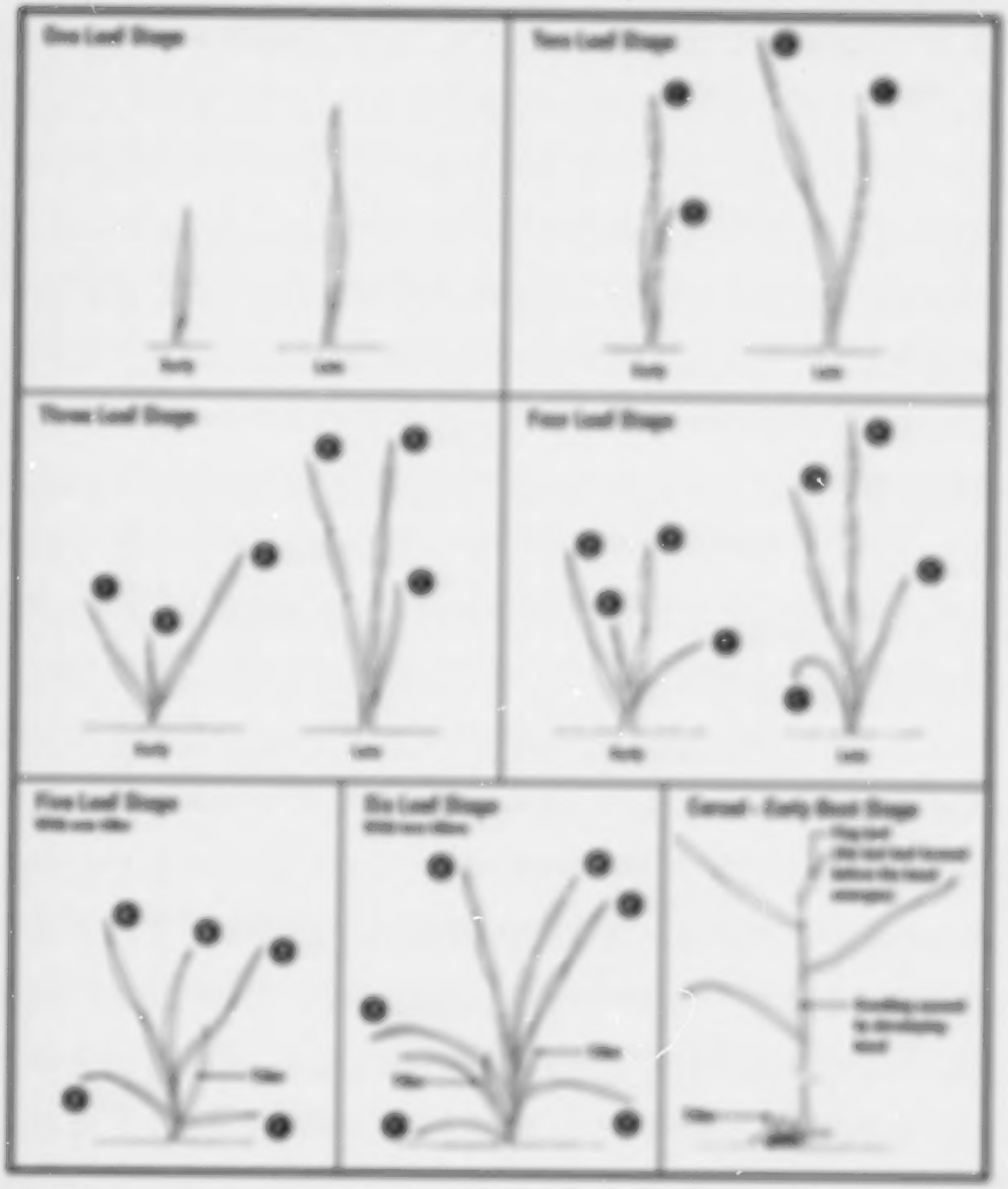
Pest Management Regulatory Agency

The Pest Management Regulatory Agency (PMRA) of Health Canada is responsible for providing safe access to pest management tools, such as pesticides and sustainable pest management strategies, while minimizing risks. The Agency registers all pest control products that may be used in Canada. If there are questions or inquiries regarding pesticides, product labels or safety precautions, contact PMRA at the following telephone numbers:

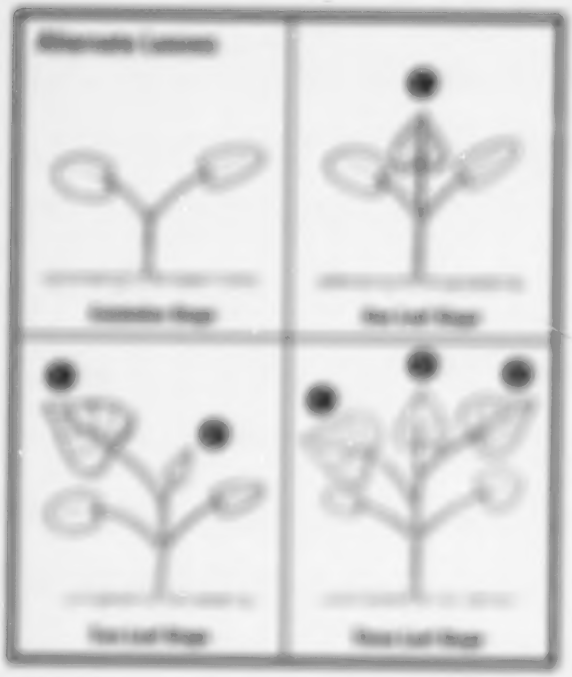
Edmonton 780-495-7034 **Calgary** 403-292-4301 **Lethbridge** 403-382-4794

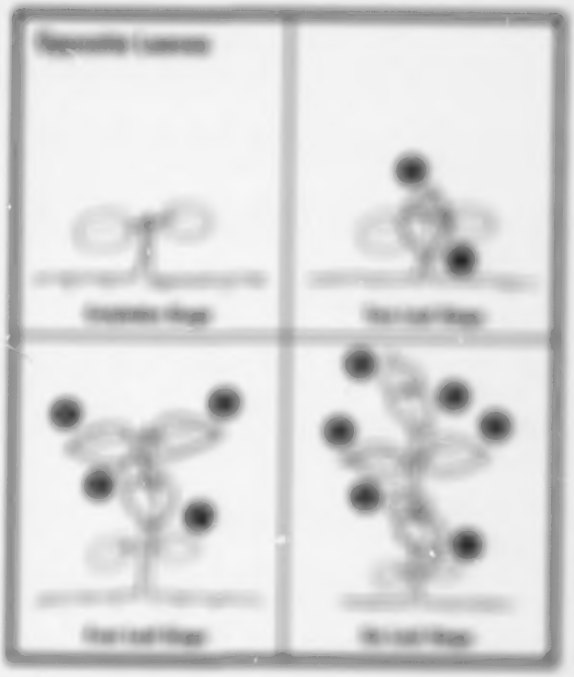
National toll free number: 1-800-267-6315 – Pest Management Information Service
Visit the website: http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php
On line versions of the current labels are available via the following link:
http://www.hc-sc.gc.ca/cps-spc/pest/registrant-titulaire/tools-outils/label-etiq-eng.php

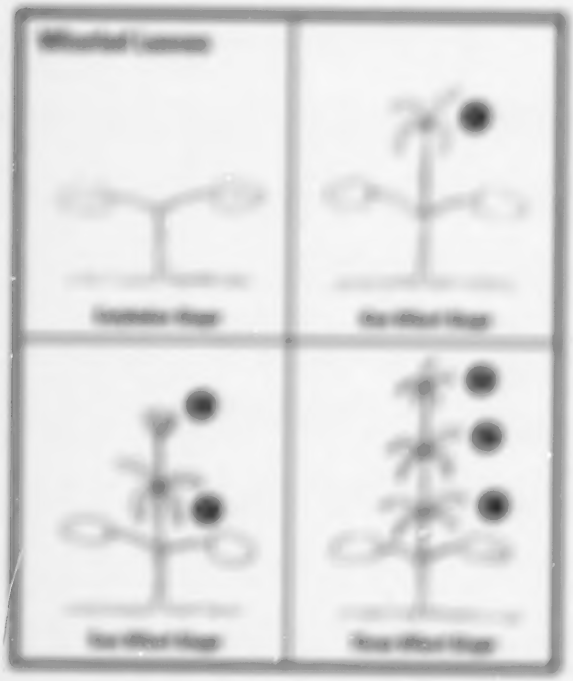
Leaf Stages – Cereals and Grasses

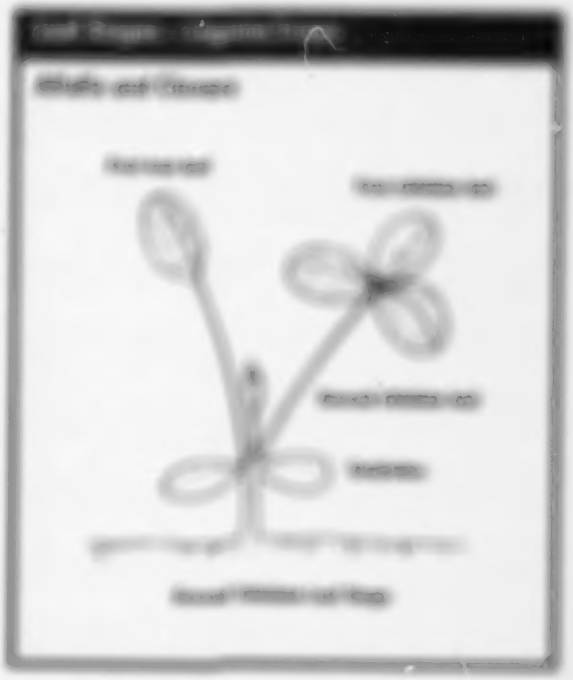


Leaf Stages – Broadleaf Weeds

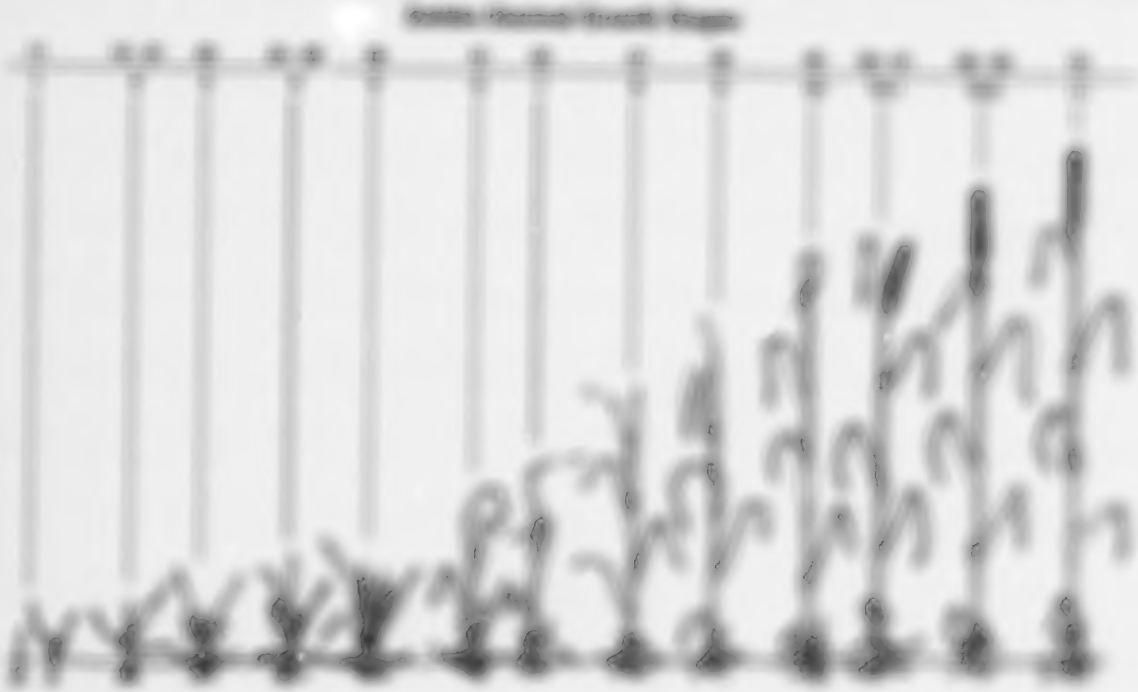






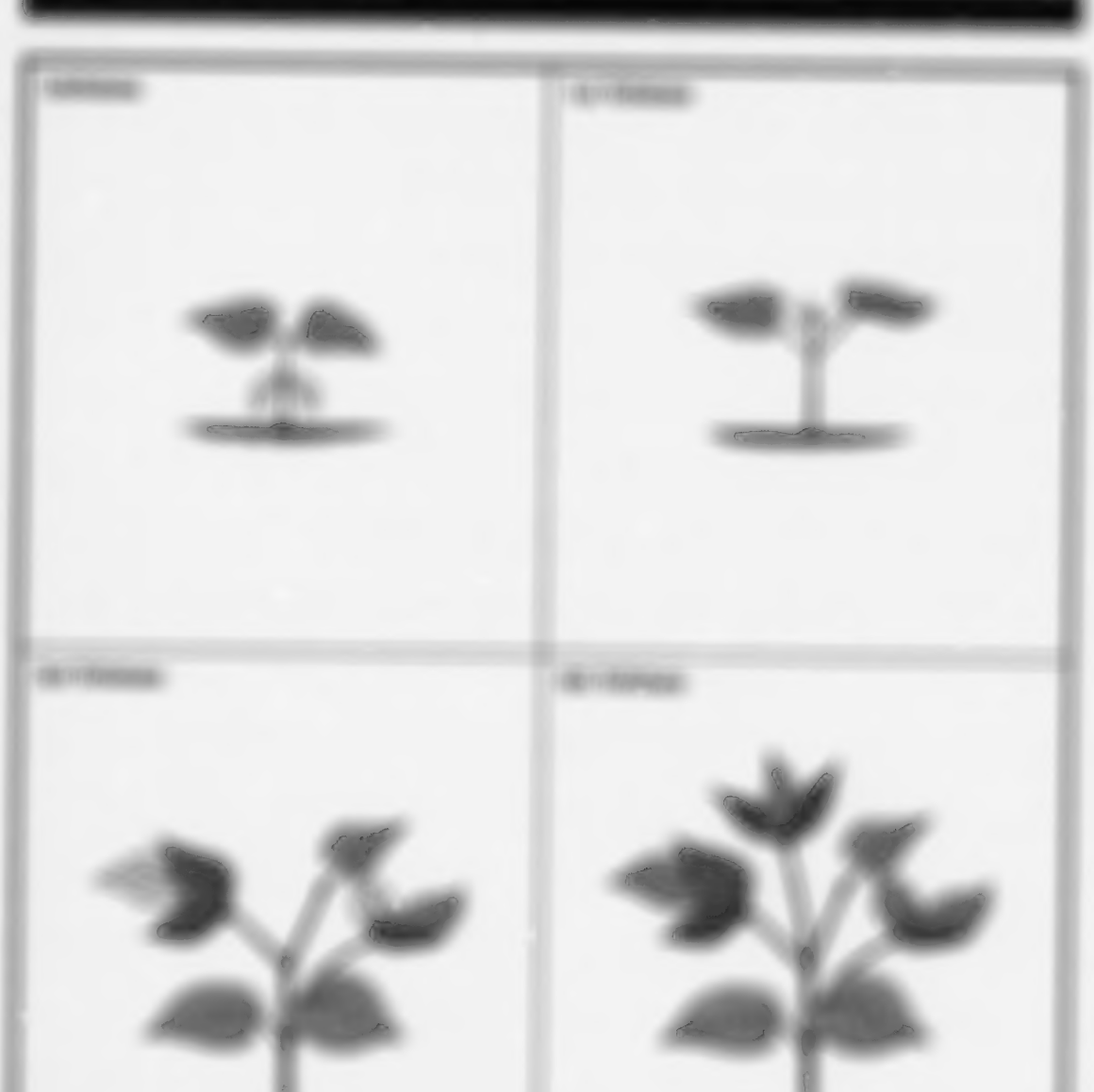


Cereal Growth Stages

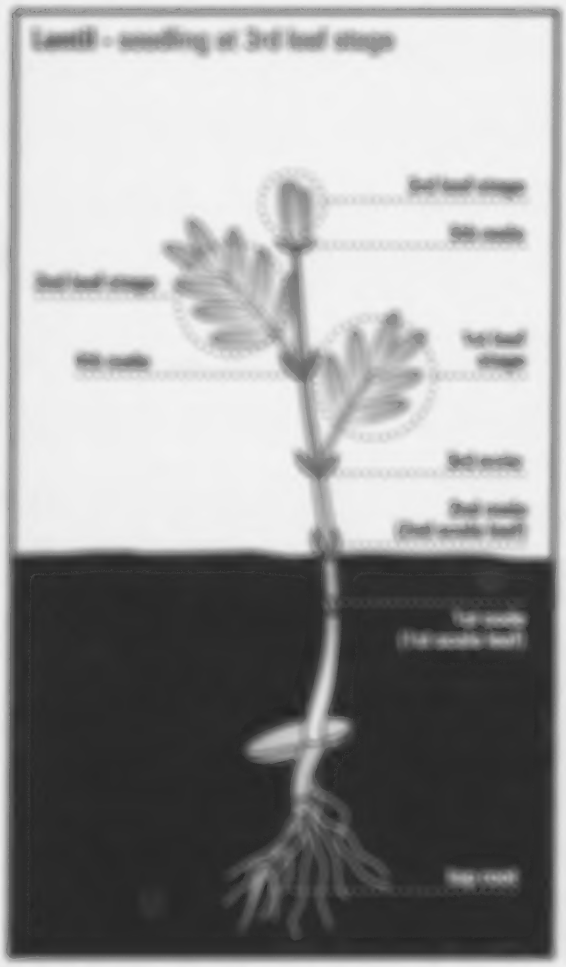


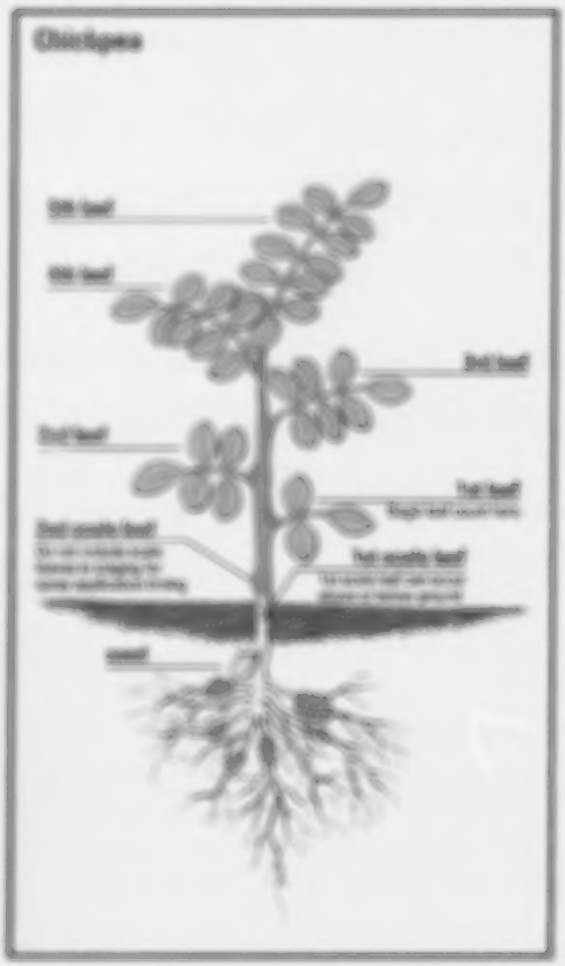
Pea Node Leaf Stages

Bean Leaf Stages



Lentil and Chickpea Leaf Stages





Lentil drawing courtesy of Saskatchewan Pulse Growers.

Source: BASF Canada
Acknowledgement: Technical expertise from Dr. G Hadavi.

How to Use This Book

This publication assists in the selection and application of pesticides. The pesticides are grouped into four main sections:

- herbicides
- insecticides
- seed treatments
- foliar fungicides.

Each section is indexed separately and has helpful selector charts after the registration information.

Use the pesticide selector charts and the detailed pesticide descriptions to choose the most appropriate chemicals. To select a suitable pesticide, follow these steps:

- Identify the pest(s).
- Refer to the chart for weed or insect pests, and record the pesticide(s) available.
- Refer to the appropriate pesticide(s) in the text, and select the product best suited to your operation.
- Apply the pesticide strictly according to instructions given on the label attached to the product container.

Chemical Pest Control Summary

Know your problem(s).

- Identify the pest(s).
- Estimate infestation level or probable economic loss to determine if treatment is required.
- Know the crop variety. Some products are restricted to, or excluded from, use on specific crop types or varieties.
- If necessary, note soil type or texture of the area to be treated.

If chemical control is necessary, choose a pesticide based on the following criteria:

- Registered products for the given crop (tank mixes may have separate recommendations).
- Pests controlled by the product.
- Crop and pest stage of growth or development.
- Recommended application time (e.g. spring, summer, fall; time of day).
- Cropping and/or harvest restrictions of product(s) considered.
- Use the least toxic, suitable product.

Read product label directions for:

- Recommended rate(s) for the particular pest, infestation level, crop and field conditions.
- Method of application.
- Any application restrictions during adverse or extreme weather conditions.
- Any other restrictions, cautions or special instructions.

Clean, prepare, maintain application equipment.

- Lubricate and repair equipment to get the best possible performance.
- Clean spray tank of residues to prevent crop damage or problems with equipment.
- Clean, calibrate and, if necessary, replace spray nozzles.
- Check pump and pressure system.

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Safely prepare pesticides for application.

- Use protective clothing and recommended safety equipment; the exposure hazard is greatest during mixing.
- Follow the mixing instructions.
- Use the specified amount and quality of water.
- Use recommended rates (tank mix rates may be different from each pesticide used alone).
- If specified, add adjuvants.
- Record the following: rates used, mix order, pesticides and adjuvants used as well as water quality for future reference.

Apply pesticides using:

- Recommended safety precautions and equipment.
- Proper application equipment.
- Recommended rates of pesticides, adjuvants and water.
- Proper time (e.g. growth stage, time of day, season).
- Recommended techniques (e.g. ground speed, pressure, incorporation).
- Record weather conditions at time of application, techniques used, growth stage of crop and pests for future reference.

Sprayer Operations

A summary of sprayer operations is presented in this publication.

Getting the sprayer ready:

- Preliminary maintenance, adjustments and settings must be made according to the operator's manual.
- The entire sprayer system should be cleaned and rinsed.
- Ensure that all nozzles are the same size and spray angle by checking the code number on the nozzle tip.
- Partially fill sprayer tank with clean water.
- Check the pump for adequate output. If the desired spraying pressure can be achieved with the agitator and boom valves open, the pump output is okay.
- Check accuracy of main sprayer gauge by installing a new gauge on the boom end temporarily and compare the pressure readings. The readings should be identical.
- Inspect spray patterns and replace tips that have streaky patterns. Flat fan nozzles should be aligned, so the patterns do not interfere with each other.

Sample Nozzle Chart

Nozzle number	Pressure kPa	Litres per minute	Litres per acre (50 cm spacing) 6 km/h	8 km/h	9 km/h	10 km/h
11001	275	0.38	30	22	20	18
110015	275	0.57	45	34	30	27
11002*	275	0.75	60	45	40	36

* Standard tips for 40 L/acre at 275 kPa and 9 km/h. For nozzles not included, refer to manufacturer's data.

Note: If spray charts are not available for your nozzles, the following formula may be used to establish the ground speed required to apply the desired litres per acre.

Formula:

Average nozzle output (L/min) x 240 ÷ km/h
Litres per acre x nozzle spacing (m)*

* Standard nozzle spacing is 0.5 m.

Example:

0.75 L/min x 240 = 180 = 9 km/h
40 L/acre x 0.5 m 20

Nozzle tip calibration

The output of individual nozzles must be within 5 per cent of the average nozzle output to provide an even volume over the width of the spray swath. Nozzles with outputs either above or below this value must be replaced.

- With the spayer operating at the recommended spraying pressure (275 kPa), collect, measure and record the output from each nozzle on the boom for one minute. Note: if nozzle strainers are equipped with ball-check valves, increase pressure by 35 kPa.
- Calculate the average output.
- Replace nozzles with output 5 per cent greater than average. Clean and recheck nozzles with output 5 per cent less than average.

Ground speed determination

Actual ground speed can be confirmed by noting the time it takes to travel a measured distance. The following ground speed chart is based on the time required to travel 800 metres.

Speed (km/h)	Travel time for 800 m (min:sec)
7	6:48
8	6:00
9	5:20
10	4:48
11	4:22
12	4:00

Sprayer Calibration – Example L/acre

Step 1: Determine the number of acres to spray using your field records.

Example: 30 acres

Step 2: Know the sprayer tank capacity, which is marked on sprayer tank.

Example: 2,000 litres

Step 3: Determine spray volume needed per acre, which can be obtained from the pesticide label or this publication.

Example: 40 litres per acre recommended

Step 4: Select nozzles for 40 litres per acre from the manufacturer's chart or the sample nozzle chart in this publication.

Example: Nozzle No. 11002 at 275 kPa and 9 km/h = 40 L/acre

Step 5: Check nozzle output. See nozzle tip calibration.

Example: Nozzle flow between 0.71 to 0.79 litres per minute per nozzle is okay

Step 6: Calculate total spray solution needed by multiplying number of acres x litres per acre.

Example: 30 acres x 40 litres per acre = 1,200 litres

Step 7: Calculate the total amount of pesticide needed from the pesticide label or this publication (multiply litres of pesticide per acre x number of acres to spray).

Example: 0.60 L/acre x 30 acres = 18 L of pesticide and 1,182 L of water in sprayer tank

Step 8: Set sprayer to travel at desired speed. See Step 4 (example) and nozzle chart.

Example: Required speed = 9 km/h (36 seconds to travel

Standard Benchmarks

Application volume: 40 litres per acre (L/acre) = 100 litres per hectare (L/ha) = 8.8 Imperial gallons per acre

Spraying pressure: 275 kilopascals (kPa) = 40 pounds per square inch (psi)

Speed for spraying: 9 kilometres per hour (km/h) = 5.4 miles per hour (mph)

Nozzle spacing on spray boom: 0.5 m = 20 inches (in.)

Height above target for 80° and 110°
Nozzle tips: 45 centimetres (cm) = 18 inches (in.)
Nozzle tips: 8002 or 11002

Note: A standard nozzle puts out 0.75 litres per minute at 275 kPa. At 9 km/h, these nozzles apply 40 L/acre of spray.

Metric equivalents

1 acre = 0.405 hectare
2.471 acre = 1 hectare
6.9 kPa = 1 psi
1.6 km/h = 1 mph
2.54 cm = 1 in
1 litre/acre = 2.5 litre/ha

Calibrating Small Sprayers

The spray volume that a backpack or hand-held sprayer will apply per acre can be determined by field testing the sprayer on a portion of an acre. The size of the test area commonly used is 1/100 of an acre. It is important that the test area surface is similar to the surface to be sprayed, so the walking speed will remain the same.

Step 1: Establish a test run distance to spray 1/100 acre (40.5 m_2) according to the swath width of the sprayer.

Swath width	Test run length
0.5 metres	81.0 metres
1.0 metres	40.5 metres
1.5 metres	27.0 metres
2.0 metres	20.2 metres

Step 2: At a comfortable walking speed, spray the test area and measure the volume of water used (repeat 2 or 3 times to obtain an average). This is the amount applied to 1/100 acre.

Example: 2 litres

Step 3: Multiply the figure arrived at in Step 2 by 100 to get the spray volume per acre.

Example: 2 L x 100 = 200 L/acre

Step 4: Determine the amount of pesticide to add per tank load. Divide the volume applied per acre by tank capacity to determine the number of fills required to spray an acre.

Example: 200 L/acre ÷ 20 L/tank = 10 fills

Divide the chemical rate per acre by the number of tank loads required to spray an acre to determine the amount of product to add per tank load.

Example: 1 L/acre ÷ 10 fills = 0.1 L/tank

Preparation and Application of Pesticides

Tank Mixtures

Tank mixtures are two or more separate pesticides mixed in the sprayer tank, as opposed to a mixture formulated by the manufacturer. Tank mixing is often done to reduce the number of applications of pesticide. Mixing a grassy herbicide with a broadleaf herbicide is one of the most common mixtures. Another reason for mixing herbicides is to include more than one mode of action on the weeds to combat the development of resistance in the target pest. Lately, there have been a lot of pesticide products put together as co-packs. That is when the tank mix partners are placed in individual containers in the same box.

Adjuvants (surfactants, wetting agents, spreaders, etc.)

Adjuvants are added to a pesticide to enhance application and/or performance. The most common adjuvants used in pesticides are surfactants. If adjuvants are required, use only those products named and recommended on the label. Failure to do so could result in the following:

- crop injury
- reduced pest control
- invalidation of pesticide warranty

Surfactants facilitate and enhance the emulsifying, dispersing, wetting, spreading, sticking, penetrating or other surface-modifying properties of liquids to bring about enhanced pesticidal action. Because these chemicals produce physical changes at the surface of liquids, surfactants are often referred to as surface-active agents.

Surfactants are generally classified into two major groups based on how they react in water: ionic or non-ionic. Ionic surfactants break down into two entities when mixed in water, – a positively charged ion (cation) and negatively charged ion (anion). An example is ammonium sulphate ($2\ NH_4^+ + SO_4^-$). Note: Ammonium sulfate is not a true surfactant.

Non-ionic surfactants do not break down in water. Consequently, they are unaffected by hard water, can be used in strong acid solutions and are more soluble in cold water than in hot water. Some of the commonly recommended non-ionic surfactants for herbicide mixtures are Agral 90, LI 700, Ag-Surf, Companion, Citowett Plus, Enhance, Super Spreader, Tween 20.

Preparing a tank mix

To avoid physical incompatibilities, go through the following general steps or use the appropriate mixing instructions below:

- add half the required amount of water and mix with one pesticide
- agitate
- with agitator running, add the other pesticide. Add pesticides to the spray tank in the following order to reduce the possibility of formation of precipitates or gums that may clog nozzles and filters:
  - soluble powders
  - wettable powders and flowable liquids
  - solutions (amines and salts)
  - emulsifiable concentrates (esters)
  - additives (surfactants)

Specific Mixing Instructions

"a" Single product mixing instructions

1. Fill clean tank to ½ full with clean water.
2. Turn on full agitation.
3. Add the proper amount of herbicide to the water in the spray tank with the agitator running. Maintain full agitation until completely dissolved and product is fully dispersed. Continuous agitation is required to keep the product in suspension.
4. After herbicide has been well mixed and is in suspension, add tank mix partners and then a recommended non-ionic surfactant, **if required**.
5. Add the remainder of the water.

On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

"b"

1. Fill tank ½ full of water.
2. Start sprayer agitation.
3. Add Group 2 herbicide and agitate vigorously, if a granule, agitate until dissolved.
4. Add tank mix partner herbicide and continue to agitate.
5. Add adjuvant (if required) and continue to agitate.
6. Add antifoaming agent if required and continue agitation.
7. Complete filling of the tank with the balance of the water.
8. If tank mix partner is an E.C. (emulsifiable concentrate), do not over agitate, to avoid inducing an invert emulsion.

"c"

1. Clean spray tank and ½ fill with clean water. Start agitation or bypass system.
2. Add broadleaf herbicide to the tank first prior to adding grassy herbicide and agitate for 2 - 3 minutes.
3. Add correct amount of grassy herbicide.
4. Agitate for 2 - 3 minutes.
5. Add correct amount of adjuvant (if required).
6. Agitate for 1 - 2 minutes before adding remainder of water.
7. After any break in spraying operations, agitate thoroughly before spraying again.
8. Use the spray suspension as soon as it is prepared.
9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

"d"

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank ½ to ¾'s full with clean water and start agitation or bypass system.
3. Add grassy herbicide first. Vigorously agitate until dissolved.
4. Add broadleaf herbicide product second followed by any registered tank mix partner (if desired).
5. Add adjuvant/surfactant(if required) and complete filling the spray tank.

"e"

1. Always start with a clean and empty sprayer tank.
2. Fill the tank 1/3 to 1/2 full of clean water.
3. With the agitator running, add the required amount of Express herbicide.
4. When Express herbicide has been thoroughly dissolved, add the required amount of the appropriate tank mix partner.
5. If the tank mix partner is an emulsifiable concentrate (EC), reduce agitation to avoid inducing an invert emulsion. Once dissolved, Express will remain in solution.
6. Add the rest of the water.
7. If required for tank mixture, add surfactant.
8. Refer to the label for specific tank mixing order and directions.
9. For repeat tank loads, reduce the material remaining in the tank to 10% of the original volume or less before proceeding with Step 1 because remaining chemicals may prevent Express from completely dissolving. If it is not possible, pre-slurry Express herbicide in a small amount (5 - 10 L) of water before adding to the tank.
10. If an anti-foaming agent is required, add last.

Avoid tank mix problems

Check the labels for recommended crops, pests and rates for tank mixes as they may be restricted compared to the recommendations for each individual product. For example, either Poast or MCPA Amine alone can be used on several crops. A Poast + MCPA Amine tank mix can only be used on flax.

Crop injury, reduced pest control or physical incompatabilities may be the result of using tank mixes improperly. When herbicides for grassy weed control are mixed with herbicides for broadleaf weed control, a partial loss (sometimes total loss) of activity on grassy weed control is quite common. When reduced weed control or crop injury is likely to occur, the advantages of tank mixing are quickly lost.

- Tank mix properties are not necessarily the same as those of the individual pesticides applied separately.
- Use registered tank mixes only.
- Check the labels for recommended crops, pests, rates and adjuvants for tank mixing.
- Follow label directions for preparing the mix.
- Use only on crops or varieties registered for the particular tank mix.
- Apply at the recommended stage of growth or development of crop and pest(s).

Sprayer Clean-out

Modern pesticides can affect susceptible crops at very low concentrations. Proper sprayer cleaning is a critical component for the maintenance of the sprayer, reducing water contamination risks and eliminating crop injury from equipment contamination.

Herbicide residue adheres to tank walls and crevices and may be brought into solution by a subsequent herbicide or a particularly effective spray adjuvant acting as a solvent. Plastic or polyethylene tanks and hoses tend to require more extensive cleaning than stainless steel tanks. Post-emergent application sprayed directly on crop foliage will have a greater potential for crop injury than soil-applied herbicide. Crop injury from sprayer contamination can occur even several months after using the sprayer without proper cleanup, and injury can occur even following several subsequent applications.

Water is needed for dilution. The more often a sprayer is rinsed out, the greater the dilution of chemical left. You have a greater dilution by repeatedly rinsing the tank with small quantities of water rather than one rinse with a large volume of water. Water is adequate to flush and rinse the sprayer with some herbicides, but others need additional cleaning agents. The additional cleaning agents needed for cleaning will depend on the herbicides used. There are common household chemicals that can be used, but most producers use commercial sprayer cleaning products. Sprayer cleaning agents can have several functions including dilution, solubilization and/or de-activation.

Cleaning agents can increase the solubility of a herbicide. Ammonium increases the pH of the solution, which increases the solubility of sulfonylurea herbicides. The agent may not help break down the herbicide, but it does help strip the herbicide off the tank surfaces and get it into solution. Chlorine bleach enhances the decomposition of sulfonylurea and many other herbicides, but it is **less** effective than ammonia at dissolving and removing sulfonylurea from the tank.

Chlorine bleach should never be added to ammonium or liquid fertilizer containing ammonium as, when mixed together, the two materials react to form toxic chlorine gas, causing eye, nose, throat and lung irritation.

Oil-based solvents such as fuel oil are most effective for removing oil-soluble herbicides, such as esters and emulsifiable concentrates. The oil solvent should be followed with a detergent rinse to remove the oil residue.

Detergents remove many materials including water and oil-soluble herbicides. Commercially available sprayer cleaning agents normally perform better than household detergents for cleaning sprayers.

The best source of information on cleaning agents and procedures is the herbicide label for the product used.

Activated charcoal de-activates organic herbicides.

A 3 per cent suspension of activated charcoal in water can be added and circulated throughout the sprayer system to tie up and de-activate any pesticide residue. The charcoal must be removed by rinsing to prevent the de-activation of a portion of the pesticide used in the sprayer.

Sprayers should be cleaned as soon as possible after use. Dried pesticide residues are much more difficult to remove than pesticide in solution. Reduce waste and excess application by only mixing the amount of pesticide required, and apply the entire amount on the field according to the label recommendations. Thoroughly rinse the sprayer tank with water, circulate the water through the sprayer system and, if possible, apply the rinsate to the treated field.

Do not clean sprayers near creeks, dugouts, sloughs, wells or any other water sources. Ensure that wash water does not come into contact with any desirable vegetation or its roots. Make sure discharged wash water (especially from insecticides) will not be accessible to children or animals. Do not contaminate any watercourse or water body with wash water.
Note: Pesticides may have specific recommendations for sprayer clean-out. Refer to product labels on the container for recommendations.

There are three main methods for sprayer tank clean-out depending on the pesticide used.

Method A

Drain contents of tank followed by 1 or 2 water rinses, 2 ammonia rinses (**NOT containing chlorine**) followed by 2 water rinses (use just prior to next sprayer event). Products that can use this cleanup method include 2,4-D, Accent, Ally, Amidine, Amidex, dicamba, dichlorprop + 2,4-D, DyVel, Escort, Everest, Express, FlexMax, Harmony Total, MCPA, Monitor, Monitor Gold, Nuance, Peyload, Pinnacle Ultra, Prism, Pursuit Ultra, Refine, Refine M, Rustler, Sundance, Tordon 22K.

Method B

Drain contents of tank followed by 2 water rinses, 2 detergent rinses, then 2 more water rinses. Products you use this method for include Ariel, Liquid Achieve SC*, Achieve Liquid Gold*, Basagran, Bromoxynil + MCPA, clethodim, Centurion*, Liberty, Puma*, Super, Reglone Desiccant*, Reward*, Scepter, trifluralin products, Venture L*.

*Manufacturers of these products recommend adding a non-ionic surfactant such as All Clear, Agral 90 or Agsurf at 0.6 L per 100 L water.

Method C

Drain contents of tank followed by several repetitions of the water rinse with nozzles and screens removed and checked for debris. Products that can use this method are Amitrol 240, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Lontrel, Odyssey, Prestige, Solo.

The above directions are general processes based on similarities of tank cleaning recommendations between products in each of the herbicide groups. Always follow the specific instructions on the product label. Follow these guidelines if label recommendations don't cover tank cleanup.

Products that are water based can usually be cleaned from the spray tank using Method C. Products formulated as an EC (emulsifiable concentrate), SC (soluble concentrate), or F (flowable) or use a petroleum-based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the sides of the tank. Most Group 2 herbicides have tank clean-out recommendations, but those that do not should use Method A for tank clean-out. If there is a tank mix of different pesticides, use the appropriate combination of methods to clean the tank.

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Group 2 herbicides will occasionally get trapped on the tank wall by petroleum-based formulations or adjuvants, resulting in tank mixtures. Add detergent at 0.25 L/100 L to the ammonia rinse to prevent this situation from happening. The detergent breaks down the petroleum coating to allow the ammonia access to the Group 2 product.

What to Do If Results Are Unsatisfactory

- Ensure the choice of pesticide(s) was suitable. Are the treated crops and pests listed on the product label(s)?
- Compare your method of pesticide preparation to the product label(s) instructions.
- Check for equipment malfunction – e.g. plugged screens, nozzles worn or mixed type or size.
- Compare your application technique with those given on label(s) – e.g. stage of growth or development of crop and pest(s), ground speed, pressure and incorporation.
- Consider weather conditions at application time – several labels include cautions against application during weather extremes – e.g. cold, heat, drought.
- Consider time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect.
- If results are unsatisfactory, seek technical help. Gather all relevant data, particularly evidence such as photos or specimens. Record wind, rainfall, soil moisture conditions, crop variety, fertility, quantity of material used, water treated and temperature at time of spraying.
- Document everything in writing. If crop damage is involved, submit a specimen for diagnosis. Disease or insect damage can resemble herbicide injury.

Pesticides and the Environment

Responding to a Pesticide Related Concern

The Environmental Protection and Enhancement Act prohibits any person from causing adverse effects when using pesticides. Farmers who witness or suspect a pesticide drift or runoff that could affect their family pets or livestock or cause an adverse effect to their shelterbelt, crops or their land should take the following actions to protect themselves and assist in an investigation that may result at a later date:

- Immediately stop any family members to go into the home to protect themselves from exposure. Close all windows and air conditioning units in the home. If they have felt spray settle on them, they should immediately remove clothing and wash exposed skin. If any physical symptoms develop, then they should seek medical assistance or call the Poison Centre at 1-800-332-1414.
- Pets should be removed from the immediate spray area or area where drift has occurred.
- If livestock are at risk, the applicator should be asked to stop the application until the livestock can be removed or conditions change so the wind is blowing away from the livestock.
- If drift has occurred in the farmyard, then outdoor furniture and play equipment should be washed before use and garden products, berry and fruit trees should not be harvested or consumed but should be monitored for unusual growth or discolouration. If the produce shows signs of damage, it should be destroyed. If berries or fruit trees show signs of damage, the berries or fruit should not be eaten. If no signs of damage occur after one to two weeks (depending on the pesticide), then all produce, berries and fruit should be washed thoroughly.
- Record as much detail of the application equipment (colour and type of spray equipment, make, model, licence plate number, company information off water trucks, colour, distinguishing features, call numbers on the aircraft). If possible, take pictures.
- Write down everything regarding what was witnessed including date and time of occurrence, weather

conditions at the time, crop being sprayed, pesticide being applied (trade pesticide containers or the pest), nature of drift witnessed, description of person helping or doing the application, other witnesses.

- Attempt to contact the adjacent landowner and hear/share your concerns.
- Contact the Alberta Environment Response Centre at 1-800-222-6514 promptly for information and assistance in investigating the concern. Some pesticide drifts quickly so prompt investigative action is required to proceed with enforcement action.

Pesticide Residues Found in Alberta Water Sources

A long-term study of water ditch in the province recently concluded. The Alberta Environmentally Sustainable Agriculture (AESA) Stream Survey was initiated in 1999 and continued until 2006. It tested the water quality in 23 watersheds throughout the agricultural areas of the province several times each year to get information on the presence and distribution of 96 possible pesticide residues in the water. Four of the watersheds received irrigation return flows and the rest were dryland.

Results show pesticide residues were commonly found in the water samples. Bear in mind that testing processes are able to detect very small amounts of chemical, far below any observable effect. Maximum pesticide concentrations were typically found in spring and during summer pesticide applications. Concentrations of detected pesticides occasionally exceeded existing water quality guidelines for either the protection of aquatic life or irrigation use.

This study highlights the importance of using due care and attention when applying pesticides as they do not necessarily remain where they are applied. Use integrated pest management strategies to improve the impact of applied pesticides and established benchmarks for the use of registered pesticides. The Farmer Pesticide Certificate program is an excellent example of training for the when, where and how to use pesticides.

For more information on the results or for a full version of the study, check Alberta Agriculture's website at http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sri12804

Pesticide Applicator Certificate

Anyone applying pesticides (herbicides, insecticides, fungicides or rodenticides) on property not owned, rented or leased by them or in exchange for a fee must hold a Pesticide Applicator Certificate (issued by Lakeland College) and a Pesticide Service Registration (issued by Alberta Environment). If someone is offering to spray your property, ask to see a Pesticide Service Registration and a Pesticide Applicator Certificate (all applicators are issued wallet-sized identification cards).

For questions pertaining to pesticide applicator certification, please call Lakeland College at 1-866-623-8646. For questions pertaining to service registrations, contact the nearest regional office of Alberta Environment.

Please remember that a certificate is not a guarantee of performance. A certificate only certifies that the certificate holder has met a minimum standard of knowledge. It cannot assess an applicator's integrity or the honesty of his business practices. If you are uncertain about the reliability of a pesticide applicator, ask for references.

Farmer Certification Requirements

Pesticide manufacturers and the federal Pest Management Regulatory Agency (PMRA), in consultation with provincial agriculture and environment departments across Canada, have agreed that some pesticides have higher toxicity and/or greater potential to adversely affect health or the environment and require producers to obtain further knowledge to purchase and use them. This means producers must take a course and pass an exam certifying that they have the knowledge to safely and effectively manage and apply these pesticides when applying them on their own property. Currently, pesticides containing the active ingredient aluminum phosphide require mandatory certification for producers to purchase and use. Aluminum phosphide is used to treat stored grain pests and for rodent control in the field.

Producers are encouraged to consider obtaining Farmer Pesticide Certification. The course contains detailed grain fumigation and rodent management information that can assist in preventing outbreaks and managing them more effectively when they occur. The Environment Farm Plan further encourages producers to learn more information about safe and effective

handling, use, application, storage, transportation and disposal of pesticides. The Human Pesticide Certificate course has been developed for producers and meets the Standard for Pesticide Education, Training and Certification in Canada. This study book is provided producers with essential information to their provincial pesticide applicator certification examination. Producers can obtain the Human Pesticide Certificate course material from the following sources:

- [illegible]

The Ag-Info Centre can also provide producers with information regarding in-class sessions that may be taken throughout Alberta and from mail order producers who write the certification examinations.

Note: The Human Pesticide Certificate does not qualify a producer to apply pesticides for other farmers or for a fee. Producers wishing to provide pest pesticide application services off their own property must obtain a Pesticide Applicator Certificate. The training materials and examinations for this certificate [illegible] are offered through individual colleges at a fee of [illegible].

Pesticide User Responsibility

Pesticide drift

Pesticide drift is a concern for ground as well as aerial applicators. Landowners are responsible for ensuring that any pesticide applications conducted on their property are conducted in a safe, responsible manner.

- The choice of chemical should be made with different land uses in mind. If neighbours have livestock, bees, orchards or gardens that may be affected by off-target drift, they should be notified prior to application. Perhaps a different chemical, formulation or application method will provide the same control and greater compatibility with neighbouring land uses.
- All persons ignored or are should be addressed prior to use, taking into consideration crucial crop growth processes and future targets. Conference with neighbours before performance as well as reducing the risk of chemical drift. The use of spray shrouds or other preventive on the sprayer will also assist in order to prevent spray drift. If you are hiring a custom [illegible] applicator ignored or are [illegible] not a [illegible] the equipment and their calibration, and be sure to check hiring the applicators to use calibration only mobile drift is occurring.
- Know the location of wildlife and bird habitat areas.
- Buffer areas should be left when applying pesticides near or sensitive crops, watercourses and farmsteads. The size of these areas may be specified on the pesticide label. Use of a low drift nozzle will improve the chemical's ability to stay in the application reactant and the degree of drift during spraying. Drift-reducing applications, increased wind speed, cooler, dense, irrigation water or other spray factors of water droplet [illegible] and can be different for the proposed pesticide application and may be applications is [illegible] to a greater than drift can adversely affect aquatic or riparian habitats. Ideally, correct application should be left during relevant water bodies to ensure more stability and to provide a good buffer and filter for agricultural [illegible]. A Special Use Approval must be obtained [illegible] effective [illegible] of pesticide application within 30 metres of the open body of water when the adjacent land is [illegible] irrigated, grazed or [illegible]. Certified applicators applying pesticides within 30 metres of an open body of water do not require a Special Use Approval as long as the pesticide they are using is classified by the Environmental Code of Practice for pesticides and they are following the conditions of application specified in the code.
- Pesticides should not be sprayed when winds are excessive (generally about 10 km/h or less) or [illegible] a drift hazard. Pesticides should only be sprayed when there is a [illegible] temperature inversion. Inversions [illegible] conditions of "drift-free" or temperature inversions a spotting should not be avoided to prevent injury. A cooler drift inversion problem is not [illegible] very little when the pesticide drift toward [illegible] with the spraying of pesticides.
- Appropriate quality that produce a good droplet size range and minimize the production of fine droplets are an important drift management tool.
- Water users do not like a chemical [illegible], and some [illegible] conditions to work healthier. If completing an application in a pleasant way, [illegible] drift [illegible] of pesticide [illegible] for applications in [illegible] to a person off-target damage. Landowners can be told [illegible] no pesticide

[illegible] The purpose of this [illegible] is to [illegible] the [illegible] of [illegible] [illegible] [illegible]

Pesticide Container Site Locations

Municipality	Site	Legal Land Location	Contact
Acadia, MD of	Acadia Valley Landfill	NW/7-25-11-W4	403-972-3808
Athabasca, County of	Edmon Waste Transfer Station	NE/1-65-22-W4	780-675-2273
Barrhead, County of	Barrhead Landfill	SW/3-60-4-W5	780-674-2331
Beaver County	Byrsky Regional Landfill	NE/10-50-17-W4	780-663-3730
Beaver County	Viking Waste Transfer Station	NE/31-47-12-W4	780-663-3730
Big Lakes, MD of	High Prairie Regional Landfill	NW/6-75-15-W5	780-523-5355
Birch Hills County	Marshall Landfill	SW/13-78-3-W6	780-694-3750
Birch Hills County	Spirit Landfill	NE/36-78-25-W5	780-694-3750
Bonnyville, MD of	Bonnyville Sewer Cleaning Plant	NW/19-63-5-W4	780-826-3551
Bonnyville, MD of	Goodridge Landfill	SW/4-63-4-W4	780-826-3551
Brazeau County	Drayton Valley – Brazeau Reg. Landfill	SE/25-49-7-W5	780-542-7777
Calgary, City of	Calgary – Forest Lawn Landfill (excludes MD #164)	3901-68 St. S.E. Calgary	403-650-6610
Camrose, County of	Camrose Regional Landfill	NE/15-46-20-W4	780-672-4765
Camrose, County of	Kelsmouth – West Street West Lake Landfill Authority	SW/14-44-21-W4	780-672-4765
Cardston County	Spring Coulee Waste Transfer Station	SW/22-4-22-W4	403-653-4977
Clear Hills, MD of	Worsley Landfill	SE/25-87-9-W6	780-685-3925
Clearwater County	Rocky Mountain House Waste Transfer Station	SE/2-39-8-W5	403-845-4444
Cypress County	Irvine Waste Transfer Station	NE/31-11-2-W4	403-526-2666
Cypress County	Medicine Hat – Lakeside Milling	NE/21-12-6-W4	403-526-2666
Cypress County	Schuler Waste Transfer Station	SE/35-19-1-W4	403-526-2666
Drumheller, Town of	Drumheller Regional Landfill	2450 South Railway Ave	403-822-1345
Edmonton, City of	Edmonton – Clover Bar Landfill	SW/28-53-23-W4	780-496-6411
Fairview, MD of	Fairview Landfill	SW/21-82-3-W6	780-835-2575
Flagstaff County	Sedgewick – Flagstaff Reg. Landfill	SW/1-45-12-W4	780-384-3353
Foothills, MD of	Okotoks – Foothills Reg. Landfill	SE/32-19-29-W4	403-652-2341
Forty Mile, County of	Bow Island Landfill	SE/23-11-11-W4	403-867-3533
Forty Mile, County of	Foremost Waste Transfer Station	NW/13-9-11-W4	403-867-3533
Grande Prairie, County of	Clairmont Landfill	NW/27-72-9-W6	780-513-3355
Grande Prairie, County of	West County Regional Landfill	01/2-22-73-9-W6	780-513-3355
Greenview, MD of	Valleyview – MD Yard	NW/13-70-22-W5	780-524-7602
Greenview MD	New Fish Creek Transfer Station	NW/16-72-21-W5	780-524-7602
Greenview MD	Prothonotary Landfill	SW/36-74-26- W5	780-524-7602
Greenview MD	Sweetthroats Landfill	SW/4-73-19-W5	780-524-7602
Greenview MD	Ridbolt Transfer Station	Ridbolt Transfer Station	780-524-7602
Kneehill County	Three Hills Waste Transfer Station	SW/25-31-24-W4	403-443-5540
Lac La Biche County	Lac La Biche Landfill	NW/36-68-13-W4	780-623-4468
Lac Ste. Anne County	Sunset – Lac Ste. Anne Reg. Landfill	NE/18-55-3-W5	780-785-3411
Lac Ste. Anne County	Weyerhaeuser Transfer Station	SE/23-57-28-W5	780-785-3411

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Municipality	Site	Legal land location	Contact
Lacombe County	Eckville Waste Transfer Station	NW/34-39-3 W5	403-782-6601
Lacombe County	Mirror Alix Waste Transfer Station	NW/26-40-23 W4	403-782-6601
Lacombe County	Prentiss Waste Transfer Station	NW/7-40-25 W4	403-782-6601
Lamont County	Lamont Regional Landfill	NW/7-56-18 W4	780-895-2566
Lethbridge, County of	Iron Springs Waste Transfer Station	SW/27-11-20 W4	403-329-1525
Lethbridge, County of	Picture Butte Waste Transfer Station	NW/27-10-21 W4	403-329-1525
Lethbridge, County of	Shaughnessy Waste Transfer Station	SE/13-11-23 W4	403-329-1525
Lethbridge, County of	Turin Waste Transfer Station	SW/23-9-20 W4	403-329-1525
Lethbridge, County of	Coalhills Waste Transfer Station	SW/23-9-20 W4	403-329-1525
Lesser Slave River, MD of	Flatbush Waste Transfer Station	NW/36-65-2 W5	780-681-2829
Leduc County	Devon Waste Transfer Station	SE/1-50-1 W5	780-955-3555
Leduc County	Thorsby – County Yard	SW/1-49-1 W5	780-955-3555
Leduc County	Warburg Sewage Transfer Station	SW/31-50-26 W4	780-955-3555
Lacombe County	Lacombe Regional Landfill	NW/7-56-18 W4	780-895-2566
Lamont County	Lamont Regional Landfill	NW/7-56-18 W4	780-895-2566
Lesser Slave River, MD of	Flatbush Waste Transfer Station	NW/36-65-2 W5	780-681-2829
Lethbridge, County of	Coalhills Waste Transfer Station	SW/23-9-20 W4	403-329-1525
Lethbridge, County of	Iron Springs Waste Transfer Station	SW/27-11-20 W4	403-329-1525
Lethbridge, County of	Nobleford Waste Transfer Station	SE/13-11-23 W4	403-329-1525
Lethbridge, County of	Picture Butte Waste Transfer Station	NW/27-10-21 W4	403-329-1525
Mackenzie, MD of	High Level Regional Landfill	SE1-110-20 W5	780-927-3717
Minburn, County of	Vegreville Landfill	NW/21-52-14 W4	780-632-4033
Minburn, County of	Mannville Landfill	SW/16-50-9 W4	780-632-4033
Minburn, County of	Ranfurly Landfill	SE3-52-12 W4	780-632-4033
Mountain View County	Didsbury – (new airport)	SW/5-32-1 W5	403-335-3311
Newell County of	Newell Regional Landfill	SE/24-19-15 W4	403-362-2772
Newell, County of	Bassano Waste Transfer Station	SE/19-21-18 W4	403-362-2772
Northern Lights, MD of	Dixonville – Long Lake Reg. Landfill	NW/3-86-24 W5	780-836-3348
Northern Lights, County of	North Star Transfer Station	NW/32-90-23 W5	780-836-3348
Northern Lights, County of	Hawk Hills Transfer Station	NW/21-84-22 W5	780-836-3348
Northern Sunrise County	Nampa Waste Transfer Station	E19-81-20 W5	780-322-3831
Northern Sunrise County	St. Isidore Landfill	SW/2-84-20 W5	780-322-3831
Pentworth, County of	Castor Waste Transfer Station	SW/3-39-14 W4	403-882-3211
Pentworth, County of	Coronation (Pentworth Resource Recovery Centre)	NE/34-36-11 W4	403-882-3211
Parkland County	Stony Plain Landfill	SE/35-52-1 W5	780-968-2231
Parkland County	Tomahawk County Yard	SW/13-51-5 W5	780-968-2231
Peace, MD of	Griffin Creek Landfill	SW/19-81-25 W5	780-338-3845
Pincher Creek, MD of	Cowley Regional Landfill	NW/6-7-1 W5	403-628-3849
Pincher Creek, MD of	Pincher Station	SW/1-7-30 W4	403-627-4151
Ponoka County	Bluffton Landfill	NE/6-44-2 W5	403-783-3333
Ponoka County	Ponoka Waste Transfer Station	NE/36-42-25 W4	403-783-3333
Provost, MD of	Provost Regional Landfill	SW/3-40-3 W4	780-753-2368
Red Deer County	Red Deer Waste Transfer Station	NE/25-38-27 W4	403-350-2163
Rocky View, MD of	Bragg Creek Transfer Station	NE1-23-5 W4	403-520-7288
Rocky View, MD of	Langdon Transfer Station	SW/28-23-26 W4	403-520-7288
Rocky View, MD of	Irricana Transfer Station	SW/28-27-26 W4	403-520-7287
Saddle Hills County	Blueberry Waste Transfer Station	SE3-80-8 W6	780-864-3904
Smoky Lake County	Smoky Lake Landfill	NW/2-65-17 W4	780-656-3730
Smoky River, MD of	Falher Landfill	NW/15-78-21 W5	780-837-2221 ext 115
Special Area #2	Brodeur Waste Transfer Station	SE/24-22-3 W4	403-854-5627
Special Area #2	Hanna Waste Transfer Station	NW/16-31-14 W4	403-854-5627
Special Area #3	Ryan Waste Transfer Station	LSD3-27-27-4 W4	403-664-3618

Municipality	Site	Legal land location	Contact
Special Area #3	Youngstown – Big Country Regional Landfill	SE29-29-9-W4	403-664-3618
Special Area #4	Monitor Waste Transfer Station	NW32-34-4-W4	403-577-3523
Spirit River, MD of	MD of Spirit River Landfill	SW31-77-5-W6	780-864-3500
St. Paul, County of	Mallaig Waste Transfer Station	NE24 60 10 W4	780-645-3301
St. Paul, County of	Evergreen Regional Landfill	NW16-56-10-W4	780-645-3301
Starland County	Rumsey Waste Transfer Station	SW24-33-21 W4	403-772-3793
Starland County	Michichi Waste Transfer Station	NW19 30 18 W4	403-772-3793
Stettler, County of	Stettler Regional Landfill	NW22 40 19 W4	403-742-4441
Strathcona County	Fort Sask. Recycling Station	11121 88 Ave. Ft. Sask.	780-417-7134
Sturgeon County	Sturgeon Regional Landfill (Rossendge Waste Mgmt)	SW36 55 25 W4	780-939-8325
Taber, MD of	Enchant Waste Transfer Station	NW16 14 18 W4	403-223-8735
Taber, MD of	Grassy Lake Waste Transfer Station	NW23 9 13 W4	403-223-8735
Taber, MD of	Taber Waste Transfer Station	SE12-10-17-W4	403-223-8735
Taber, MD of	Vauxhall Waste Transfer Station	SW12 13 16 W4	403-223-8735
Thorhild, County of	Thorhild	NE5 60 21 W4	780-398-3741
Two Hills, County of	Two Hills Regional Landfill	NE5 55 11 W4	780-657-3358
Two Hills, County of	Willingdon Seed Cleaning Plant	NE1 56 15 W4	780-657-3358
Vermilion River, County of	Marwayne Waste Transfer Station	SE34 52 3 W4	780-846-2244
Vermilion River, County of	Paradise Valley Waste Transfer Station	SW7-47-2-W4	780-846-2244
Vermilion River, County of	Vermilion Transfer Station	SW5 51 6 W4	780-846-2244
Vulcan County	Mossleigh Transfer Station	NW14-20-25-W4	403-485-3003
Vulcan County	Vulcan Waste Transfer Station	SW4 17 24 W4	403-485-3003
Vulcan County	Lomond Transfer Station	NE11-16-20-W4	403-485-2241
Vulcan County	Milo Transfer Station	SW6-19-21-W4	403-485-2241
Vulcan County	Champion Transfer Station	SW29-14-23-W4	403-485-3003
Wainwright, MD of	Wainwright – Andrukow Group Solutions	SW28 44 6 W4	780-842-4454
Wainwright MD of	Irma Shop Yard	5016 – 53 ave. Irma	780-842-4454
Wainwright MD of	Edgerton (across street from Viterra)	SW1-44-4 -W4	780-842-4454
Wainwright MD of	Chauvin Landfill	NW 8-43-1-W4	780-842-4454
Warner, County of	Border Seed Cleaning Plant	SW29 2 14 W4	403-642-3635
Warner, County of	Sunshine Seed Cleaning Plant	NW12 6 19 W4	403-642-3635
Westlock County	Westlock Regional Landfill	NE27-59-26 W4	780-349-3346
Wetaskiwin, County of	Peace Hills Waste Transfer Station	SW29-46-24-W4	780-352-3321
Wheatland County	Hussar Waste Transfer Station	NW1 24 20 W4	403-934 3321
Wheatland County	Standard Waste Transfer Station	SW10 25 22 W4	403-934-3321
Wheatland County	Strathmore Waste Transfer Station	NE34 23 25 W4	403-934-3321
Willow Creek, MD of	Willow Creek Regional Landfill	NW22-11-26-W4	403-687-2603
Woodlands County	Fort Assiniboine – County Yard	SW2 62 6 W5	780-584-3866
Woodlands County/Whitecourt	Whitecourt Regional Landfill	NW29-58-10-W5	780-648-2273
Yellowhead County	Parkcourt Waste Transfer Station	SE35-54-08-W5	780-325-3782

Note: Some municipalities have other "temporary" sites for dropping off empty pesticide containers. Phone the municipal contact number for locations and operating hours.

Safety Precautions

Warning Symbols

Visual warning symbols on pesticide labels indicate the kind of harm that can result from pesticide misuse or mishandling. They alert the user to the degree of the hazard (by the shape of the border) and to the type of hazard (by the centre picture).

Flammable

The "fire" symbol is a warning that the pesticide is flammable or easily ignited. Keep the pesticide away from heat, sparks or open flames. Do not smoke while mixing or applying the product.

Explosive

The "exploding grenade" symbol indicates that the pesticide can explode, e.g. pesticide in pressurized cans. Explosive conditions may also be created by using Roundup or Rustler (glyphosate) in a galvanized steel spray tank.

Corrosive

The "corroded hand" symbol indicates that the pesticide is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect the skin and eyes when using these products.

Poisonous

The "skull and crossbones" symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

Pesticide Toxicity, Hazard and Risk

The terms "toxicity," "hazard" and "risk" do not all have the same meanings. Users of pesticides should understand the difference in meanings among these terms.

Pesticides vary in **toxicity** or the degree of being poisonous. How poisonous a pesticide is depends on its inherent chemical and physical properties.

The relative **hazard** of a pesticide depends on the toxicity of the pesticide, the dose received and the length of time exposed. No hazard exists when the pesticide container is sealed, but once the seal is broken and the pesticide is handled, exposure can occur, and a hazardous situation is created.

Risk of exposure is a fu...tion of how an individual handles the product. Although the hazard may be the same whenever a pesticide is being poured into the spray tank, the risk is different if one person wears a hard hat, goggles, respirator, nitrile gloves, waterproof apron and neoprene or rubber boots and the other person wears none of these. A knowledge of the toxicity of a product and the potential for personal exposure can be used to lower the risk of exposure. The user can control the risk by carefully managing the hazard. Even when highly toxic pesticides are used, if the degree of exposure is kept low enough, the risk can be kept at an acceptable level. The toxicity of the pesticide can't be changed, but the risk can be managed.

LD_{50} values are used to rate the toxicity of the pesticides. The LD_{50} is an abbreviation for the dose (expressed in milligrams per kilogram of body weight of the test animal) that is lethal to 50 per cent of the

The following table relates the oral LD_{50} value (mg/kg) of a pesticide to its toxicity symbol.

LD_{50} less than 500 mg/kg indicates high toxicity	LD_{50} 500 - 1,000 mg/kg indicates moderate toxicity	LD_{50} 1,000 - 2,500 mg/kg indicates low toxicity	LD_{50} greater than 2,500 mg/kg indicates very low toxicity
Danger Poison	Warning Poison	Caution Poison	

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group of test animals. For example, if a pesticide has an oral LD_{50} value of 10 mg/kg and the test animals each weigh 1 kg, 50 per cent of the animals would die of poisoning if each ate 10 mg of the pesticide.

The smaller the LD_{50} value, the more toxic the pesticide. The LD_{50} value usually refers to the active ingredient in the pesticide formulation. In this publication, the LD_{50} of the formulated product is also given when available.

Symptoms of Poisoning

Pesticide poisoning can be acute (due to a single, large dose, like an accident) or chronic (due to continued exposure over a long period). For example, chronic health problems may develop after long term exposure to pesticides low in toxicity. Accidental contact with a pesticide, however, will not necessarily lead to poisoning. Both types of poisoning can exhibit mild, moderate or severe symptoms as follows:

Mild poisoning symptoms: Mild symptoms may be vague and can be compared with a sickness such as influenza. Typical symptoms include nausea, headache, tightness of chest, loss of appetite and stomach cramps. These symptoms can be immediate or be delayed by 12 to 24 hours.

Moderate poisoning symptoms: These symptoms are usually more pronounced than mild symptoms. They include nausea, trembling, lack of muscle co-ordination, excessive saliva, blurring of vision, tightness of chest, difficulty in breathing, flushed or yellow skin, abdominal cramps, vomiting, diarrhea, tearing from eyes, profound weakness, rapid pulse and cough.

Severe poisoning symptoms: Severe symptoms are often more specific and require immediate hospital treatment. They include vomiting, diarrhea, excessive sweating, inability to breathe, convulsions, fever, intense thirst and coma. It is imperative to reduce exposure when using all pesticides whether they are highly toxic or have very low toxicities.

Reducing the Risk of Exposure to Pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

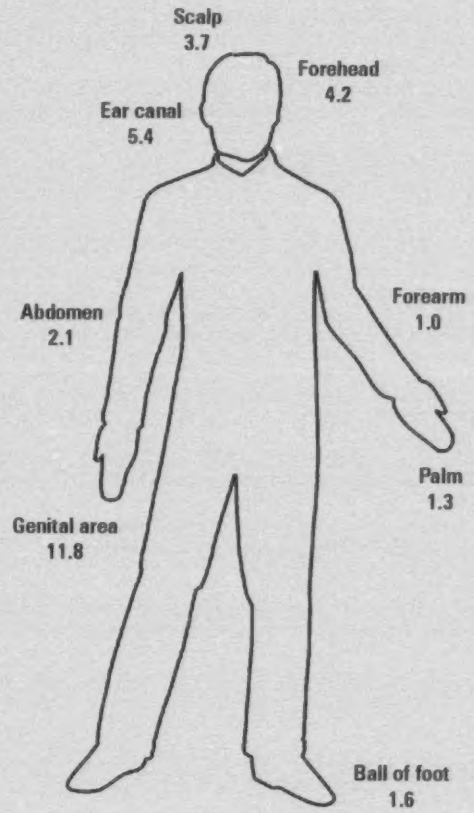
Skin

Absorption through the skin is the most common route of exposure. Different areas of the body absorb pesticides at different rates. For example, assuming the forearm is given an absorption rate of 1.0, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 – almost 12 times greater than the forearm.

The genital area and the head are the areas where absorption is the greatest.

Absorption Rates

Compared to forearm, which is 1.0



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Reducing the risk of exposure through the skin is possible through the careful selection, use and care of protective clothing and safety equipment. Protective clothing and equipment can provide a barrier that reduces contact between the skin and pesticides. See the section on *Protective Clothing and Equipment* for recommended wear. To help reduce pesticide build-up, clothing should be washed daily using recommended procedures; see *Cleaning of Clothes and Equipment* section.

How skin is exposed to pesticides:

- Direct handling of pesticides – this includes any activity where the pesticide could come into direct contact with the skin, from spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled; extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates, regardless of toxicity.
- Transfer from contaminated clothing or equipment – clothing worn during pesticide use should be restricted to that use only, thereby eliminating the possibility of continued dermal exposure due to pesticide residues remaining in the clothing. Some types of concentrated pesticides are not removed after multiple washings. Clothing contaminated by accidental spills of concentrated pesticide should be discarded rather than laundered. Avoid entering the house wearing contaminated clothing and equipment. Pesticides may be transferred from boots to floors and carpets where children and pets may be exposed.
- Transfer to other clothing during washing – always store and wash pesticide-contaminated clothing separately from the rest of the family wash as pesticides can be transferred to other clothing during the laundering process.

Protective Clothing and Equipment

Even pesticides not absorbed by the skin may still cause skin problems such as redness, blisters or dry scaliness, which may lead to serious skin eczema and dermatitis. Good personal hygiene is important to help minimize pesticide absorption through the skin. Shower, shampoo your hair and put on clean clothing immediately after you finish using pesticides for the day or after an accidental spill. Cuts and scrapes should be cleaned and bandages changed after handling pesticide to avoid possible dermal absorption from contaminated bandages.

Eyes

Eyes are very sensitive to pesticides and can be exposed to vapour or fumes, dust, spray drift, or accidental spills and splashes when containers of liquid concentrates are being opened or when the concentrated chemical is being poured into the sprayer tank. Do not wear contact lenses when mixing or applying pesticides.

Ears

Sprays and spills may contaminate the head and ear canal.

Nose

Pesticides can enter the body through breathing in fumes, dusts or spray mists. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs. To minimize exposure, respirators always should be worn when opening and mixing all concentrated pesticides. Read the pesticide label and follow the precautions outlined. A respirator may be required when applying pesticides.

Mouth

Pesticides can enter the body through the mouth when users eat, lick their lips or smoke when hands are contaminated. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisoned if they drink pesticides stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

Minimum Protection

A minimum level of protection is required when working with dilute, less toxic or granular pesticides. Where there is a direct contact with the pesticide, add extra protection.

Hard hat
(wide brimmed, no leather liner)

Coveralls
cloth or disposable (wear closed at neck, over long-sleeved shirt and full-length pants)

Gloves
unlined, nitrile or neoprene (cuff gloves and wear sleeves over gloves)

Boots
neoprene overboots or high rubber boots (wear pants outside boots)

Extra Protection

Extra protection is required for mixing, loading and handling pesticide concentrates, especially when working with highly toxic pesticides. Check pesticide label.

Goggles or face shield

Respirator
(check label if needed for less toxic pesticides)

Hooded coveralls
chemically resistant (when mixing, loading or applying very toxic pesticides and when application drenches applicator)

Waterproof apron
(when handling all concentrated pesticides)

Coveralls

Wear coveralls, closed at the neckline and wrists and over full-length pants and long-sleeved shirts, also worn closed at the neckline and wrists.

Minimum protection

- Cloth – if cotton or cotton/polyester coveralls are worn, they should be washed after daily use. Some pesticides are difficult to remove from cloth.
- Disposable, nonwoven – a number of limited use, disposable, nonwoven, hooded coveralls are now on the market; instead of laundering, they are disposed of at an approved landfill and thus, the problem of decontamination is avoided. Not all disposables are suitable for pesticide use, especially for liquid pesticides. Check with your supplier.

  Common disposable brands are Kimberly-Clark KleenGuard LP (Liquid Protection) and DuPont Tyvek. Both disposables provide an extra layer of protection. Check for comfort and size before purchase. Disposable coveralls are more fragile than standard ones and are only expected to last a limited number of wearings.

Extra protection

- DuPont's Tyvek QC (polyethylene coated Tyvek) and Tyvek/Saranex (saran coated Tyvek) provide greater durability and are more repellent to larger pesticide spills. However, they are more expensive and must be specially ordered. These coveralls are uncomfortable when worn for long periods in hot weather because of heat build-up and lack of breathability.
- Impermeable rainwear – two styles are available: coveralls or two-piece suits. They are similar in price to the more expensive disposable coveralls. Generally, they are a P.V.C. (polyvinyl chloride) coating on nylon. Although excellent in liquid repellency, they too can be uncomfortable because they do not breathe and cannot be worn for long periods in hot weather. After use, they should be hosed down and washed with soap and water.

Remember, When Using Disposable Coveralls . . .

- Before purchasing any disposable coveralls, make sure they are recommended by the manufacturer for pesticide use. Avoid wearing all-purpose disposables.
- When removing disposable coveralls, take care not to contaminate the interior if the coveralls are to be worn more than once. Between wearings, hang in a well ventilated area, away from other clothing.
- Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.
- Replace with a new coverall when: severe pilling (balls of fiber on the surface), rips or holes occur. To discard, place in a plastic garbage bag and take to an approved landfill site; do not burn.

Gloves

Unlined gloves are required when handling, mixing or pouring concentrated pesticides, during field application and when equipment needs adjusting. Never use bare hands to do these jobs. Studies reveal that the greatest exposure is often through the hands. A variety of glove materials may be found on the market. Unlined nitrile and neoprene gloves are suitable for most pesticides. All gloves should be washed soon after the concentrated chemical has been mixed as pesticide may penetrate into the material if it is not cleaned off. Care should be exercised to avoid contaminating the interior of gloves when they are taken off and put on. If possible, wash the outside of the gloved hands prior to glove removal, to avoid contaminating the interior. At the end of the day, both the inside and outside of the glove should be washed.

Prior to use, inspect gloves and replace immediately if cracks, swelling, discolouration, holes or rips develop. Cuff gloves and wear sleeves over top of gloves to help prevent spills and splashes of pesticides from running down inside the gloves.

Do not continue to wear contaminated gloves and avoid wearing leather, cloth or natural rubber gloves as they soak up the chemical and become a source of continuous contamination.

Boots

Neoprene overboots or long rubber boots are the recommended footwear as they are less likely to absorb pesticides and are more easily cleaned. Be sure to wear the pant leg over the boot to avoid pesticides running down into the boot. In case of such an accident, wash the boots out immediately; otherwise, wash the outside of the boots daily.

Minimum protection

Prevent powders, dusts or spray mists from being deposited on the hair or scalp by wearing a hard hat. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band.

Extra protection

Protect hair, scalp, ears and neck from dust, sprays and spill when you are likely to contaminate the head area. Wear a wide brimmed hat that covers the neck or hooded coveralls, with the hood under the hard hat. Only wear ear plugs if required for hearing protection. Use disposable ear plugs made of self-molding foam, and dispose of them after use.

Goggles or face shields

Protect the eyes and face against pesticide vapours, dust and splashes when handling concentrated pesticides. Goggles and face shields must have resistance to chemicals and have ventilation to prevent fogging. Clean after each day of use and store away from direct sunlight.

Avoid Wearing

(These materials absorb chemicals and prol. ~ exposure to the wearer; most are not easily cleaned).

- fabric baseball caps
- cloth or leather gloves, shoes or boots
- natural rubber or plastic gloves (not resistant to pesticides)
- leather belts, watch bands and cell phone holders
- contact lenses

Respirators

Purchase a respirator recommended for the pesticides used and make sure it fits properly. A good airtight fit is required over the nose and mouth; beards and moustaches can prevent a close fit.

Respirators have two cartridges attached onto a facepiece. Each cartridge contains a pre-filter that removes dust particles and a filter of activated charcoal that absorbs the chemical. The cartridges should be unscrewed and replaced as soon as any odor of the pesticides is detected in the facepiece. Clean respirators after each day's use; unscrew the cartridges and wash the facepiece with soap and water. Rinse the facepiece in clean water, dry with a clean cloth and screw on the cartridges. The clean respirator should be stored away from direct sunlight in a sealed plastic bag to prevent cartridges from absorbing airborne contaminants. Disposable respirators are also available. Replace as soon as any pesticide odor is detected. Wash after daily use – do not get the charcoal filter wet. Store in a sealed plastic bag. Note: Gauze and dust masks are not respirators and are not recommended for pesticide use!

Gas masks

These are used when an applicator is likely to be exposed to very high levels of pesticides (fumigants). The face piece covers the eyes, nose and mouth. It is connected by a flexible hose to a charcoal canister worn on the belt. The lifespan of teh canister is longer than that of the respirator cartridges. Manufacturer's directions are to be followed for cleaning and storing gas masks and canisters.

Minimize Exposure

- wear recommended protective clothing and safety equipment
- limit clothing worn for pesticide use to that use only
- wash clothing and equipment daily after use
- replace clothing and equipment that is no longer serviceable

Cleaning of Clothes and Equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

- handle soiled clothing with unlined, nitrile gloves
- remove pesticide granules from cuffs and pockets outdoors
- discard any garment saturated with pesticide concentrate
- temporarily store clothing in disposable plastic bags before washing
- take disposables to approved landfill

Washing pesticide soiled clothing

- wash daily
- wash separately from regular laundry
- pre-treat with a stain removal product if an emulsifiable formulation used, or
- pre-rinse on pre-wash cycle of washer
- avoid overcrowding washer
- use hot water setting
- use full water level and normal cycle
- use extra heavy duty detergent as recommended for heavily soiled loads
- repeat wash pr cedure
- clean washer after use (run empty washer through full cycle with hot water and detergent)

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Drying

- Tumble dry to prevent contamination of dryer and increase the chemical breakdown of pesticide residues.

Washing other equipment

- wash other equipment daily in hot soapy water (rubber boots, goggles, spirits, gloves, boots and respirator (avoid getting chemical wet; remove if possible)

Specific Cleaning Procedures for Pesticides

The standard washing procedure mentioned above reduces pesticides from contaminated clothing, but new research is gradually identifying more specific washing procedures to further reduce the residues on contaminated clothing or equipment. Note that each product requires unique washing procedures, and more testing is required for those that still have high residues remaining. Refer to the guide below:

Recommendations

1. Off-gas over-washer in an appropriate level. For better protection, choose a disposable coverall and discard after use.
2. Wash contaminated clothing in outlined fragrance for required time. (Examples of this product are Odor Grab or Citra-Solv).
3. Re-wear contaminated clothing before washing for wash.
4. (42 °F) washing machine with warm water (38°C), add 250 mL of Alkaline bleach. Soak for required time. Follow box of strength and colour results from bleach wash, never as the colors clear for colour polymer bleach). Note: Acceptable levels of residue remaining – less than 5 per cent.

For further information on protective clothing for pesticide use, contact the Alberta Ag-Info Centre toll-free at 310-FARM (3276) or 1-866-882-7677.

Product	Suggested washing procedure	% Residue remaining
2,4-D (amine)	One wash	<1%
2,4-D (ester)	1/2 hour Limonene wash (5 chemicals), one wash	9% (1)
Dacthal	One wash	1%
Dimethoate (Lorsban, Rancher, Rymed)	2 hour bleach wash (4), one wash	<1%
Diuron	Anti-wash (AF1) or Spray n Wash wash, one wash	1%
Ionoxynil (Buctril)	One wash	1%
Malathion (Atrisol)	Two washes	3%
Trifluralin (Treflan)	Spray n Wash wash (3), two washes	9% (1)
Any concentrated pesticides	Discard	Too high

Source: Effective Pesticide Decontamination Procedures for Clothing, Equipment and Spills, Research Project Report, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Program, 1994.

Other Precautions and Safety Tips

Fresh water supply

Always carry a supply of fresh water in clean, air-tight containers and a clean pair of gloves for equipment adjustments.

Remote control devices

Devices (e.g. solenoid valves) can be installed to remotely control the sprayer, preferably from outside the tractor cab. These devices can reduce operator exposure to pesticides.

Sprayer cab cleanup

After spraying pesticides, the inside of the tractor cab, including vents, are a source of contamination by wiping with rinsate soaked cloth and sponge.

Sprayer cab filters

Charcoal filters are available for fitting over the tractor air intake screens, or filter cab protection those for air entering the tractor cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and Haying Restrictions

Traditionally, pesticides have been registered for use on crops grown to maturity. Grazing or cutting of the treated crop for hay has not been considered in the harvested use, or residue information on the treated plant has not been required in the registration process. If grazing or haying interval is considered in the registration process only if the grass sector is to be fed to livestock. Consequently many pesticide labels are currently silent about grazing. [illegible] or restrictions on the label or no direction or use of a cab to graze the crop is listed on the label prior to harvest. For absence of this information may result problems in increase that does there is no specific warning with respect to grazing, it is safe to do so.

Prevent pesticide labelling policy to prevent to define [illegible] for acceptable uses of the product. In most use for a use rate increase has "be sure". Therefore, to prevent for consistent loss if something is not used on the label, it is accepted for use. In such accepted use can only be made through the establishment of tolerance does not support that use.

In light of the above, pesticide labels that are silent on grazing will carry the following statements: "do not graze the treated crop or cut for hay (does not use sufficient data available to support such use."

Kidney bee safety

Bee care be affected by pesticides, including those on and associated with treated wood. Avoid grazing cattle of treated and hay bees or contaminating puddles of water (bee which bee may drink. Spray cattle in the morning or late in the afternoon when bee activity is at a minimum. Wear handgloves if you handle, as they can confuse for bees a wood bees each side of pressing bees it cuts.

Farm Safety Program

For further information on farm safety, please contact the Farm Safety Program of Alberta Agriculture and Rural [illegible] Development, Edmonton, Alberta, [illegible].

Safety Equipment and Clothing

Protective clothing and equipment is available from the following:

[illegible]
Pyrol Alloy
1-800-363-4963
Lynas Safety Limited
1-800-661-5975
Midlands Envelope Inc.
1-800-661-4642

First Aid

Poison Information Centres
(Alberta): 1-800-332-1414
Calgary only: 944-1414

Standard First Aid Measures

If in eyes

If on skin

If swallowed

If conscious: Have the person sip glass of water. If able to swallow, do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

If the product contains a petroleum distillate:

If unconscious: Call a poison control centre or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give any liquids to the person. Do not give anything by mouth to an unconscious person.

If inhaled:

Glossary of Terms in Pest Control

Alberta Agriculture Offices

[redacted]

[redacted]

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Chemical Weed Control in Alberta

Chemical weed control functions on the basis that certain chemicals are capable of killing some kinds of plants (weeds) without injury to other kinds (crops). As a group, these chemicals are called herbicides.

Herbicides are effective tools for the control of weeds, and **herbicides demand respect.** When properly used, herbicides can safely and effectively accomplish their objective; misused, they can cause severe economic loss. The misuse of herbicides is usually due to:

- ignorance of their characteristic activity and/or
- carelessness in their application

Misuse includes such factors as applying improper dosages; using the wrong herbicide; failure to properly calibrate application equipment; failure to wash application equipment thoroughly before switching herbicides; improper soil incorporation; timeliness of application, with respect to the growth stage of crop or weed.

This guide lists the major herbicides registered for field crop use in Alberta. Refer to product labels attached to the herbicide containers for final detailed information.

Conservation tillage and herbicides

Conservation tillage is a general term used to describe a cropping program in which some or all of the tillage operations are replaced by using herbicides to control weed growth while, at the same time, preventing soil erosion and conserving soil moisture. The following terminologies are included under conservation tillage: reduced tillage, minimum tillage, no-tillage or zero tillage, direct drilling and chemical fallow.

Herbicides for conservation tillage are listed below. Rates of application, weeds controlled and other pertinent information can be found by referring to each herbicide in this guide.

- **2,4-D or MCPA** – To control winter annuals such as flixweed, shepherd's-purse and stinkweed. Application should be made to emerged weeds prior to freeze-up.
- **glyphosate Formulation** – Apply any glyphosate formulation mixed with a non-ionic surfactant (if required) to actively growing weeds. Can be tank mixed with Banvel; 2,4-D amine; Pardner.
- **Rustler** – Controls annual grasses, broadleaf weeds and volunteer cereals. Can be tank mixed with 2,4-D.

Nitrate poisoning of livestock

Nitrate accumulations may be caused by leaf damage from frost, hail or herbicide action. Symptoms of nitrate poisoning include reduced milk production and growth rate, abortions and in severe cases, death by suffocation. A veterinarian should be called immediately if livestock show unusual symptoms when they are fed forages that may contain nitrates.

After severe frost, hail or herbicide damage, the nutrient value of the crop will decrease rapidly. In terms of nutrition, it is important to harvest as soon as practical; however, in the case of herbicide treated crops, there may be a waiting period specified on the herbicide label. Especially in the case of high risk crops, such as oats or corn, a delay may be advisable to permit nitrate levels to decrease. If there is a possibility of high nitrates in feed, have the feed analyzed at a feed testing laboratory.

Weed control in forage crops

Make sure all forages, as well as any companion crops, present in the stand are listed for the intended use on the herbicide label. Follow the label directions on the herbicide container closely, especially for stage of crop and weed development, Water Volume, Grazing and feeding restrictions.

Herbicide performance ratings

Herbicide performance ratings (numbers in brackets after the names of crops or weeds) are based on data from the Expert Committee on Weeds (Western Section) Research Reports. These numbers are not absolute and, therefore, not a guarantee of expected performance. They are meant to be used as a guide when selecting a herbicide. When a number is not included, there is not sufficient data to provide a rating.

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Tolerance of crop to herbicides
The number appearing in brackets following the crop on which each herbicide is registered represents the expected tolerance of the crop to that herbicide. Due to variations in variety, weather, timing and application techniques, this number is only approximate. 0 = complete kill of the crop and 9 = no measurable injury to the crop.

Level of weed control with each herbicide
The number appearing in brackets after each weed represents the average level of weed control expected with the herbicide. Due to variation in weather, growth stage, time of day, application technique, etc., this number is only approximate. 0 = no control of the weed and 9.0 = complete kill of the weed. A weed control rating of 7.0 or greater is considered commercially acceptable.

Water Used for Spray Application

The quality of water used can affect the efficacy of some herbicides. Water quality includes the cleanliness (silt, organic matter and soil), the hardness or softness of the water and the water pH.

Some herbicides, including glyphosate containing herbicides, adsorb to silt and organic matter, become inactivated. This causes a decrease in herbicidal activity. Suspended soils and organic matter in water is usually a problem where surface water is being used.

Other herbicides, including 2,4-D amine and several Group 1 herbicides have reduced efficacy when applied in mineralized water. Minerals include both calcium and magnesium sulfates, which result in 'hard' water, and excessive sodium bicarbonate, which results in 'soft' water. Mineralized water is most commonly a problem when well-water is used. When efficacy decreases, it is most apparent on hard to control weeds and is easily confused with late application, poor growing conditions or reduced herbicides rates.

The pH of water or water temperature can affect the ability of some herbicides to stay dissolved in the spray solution. To avoid these problems, the manufacturer will suggest a specific order to add surfactant or mixtures of products. For example, to mix the herbicide Horizon, the herbicide is added first, followed by the surfactant, Score, and all mixing is done under agitation. Other water conditioners out there include Choice Weather Master and N-Tank. Follow label recommendations for mixing. Products cannot work unless they are dissolved or miscible (capable of being mixed) in the water. Also, if products are not in solution they can form a sludge in the spray tank and block nozzles.

It is best to avoid using poor quality water if possible; however, the following remedies can limit the loss of herbicidal activity.

Herbicide and Water Quality

Herbicide	Quality concern	Remedy
2,4-D amine*	Mineralized water	Use a non-ionic surfactant like Agral 90
Achieve (tralkoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Poast (sethoxydim)	Mineralized water	Add ammonium sulfate (1% v/v)
Roundup/Touchdown	Mineralized water	Add ammonium sulfate fertilizer 3 kg/100 L application solution
Roundup/Touchdown	Silty or dirty water	Filter water or use clean water
Select (clethodim)	Mineralized water	Add ammonium sulfate (1% v/v)

* **Note: 2,4-D Ester formulation is not affected.**
Information primarily derived from F. A. Holm, J. L. Henry, D. W. Gruber and P. McMullan, 1995 Water quality effects on phenoxy and ACCase inhibiting herbicides. Proceedings of the Weed Research/Symposium, University of Alberta.

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Pesticide Resistance

The Problem

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. Resistance occurs when some pests survive a pesticide application; this part of the population is naturally more tolerant to the chemical. These individuals reproduce and create a population that is resistant to the pesticide. Producers should follow agronomic practices that both prevent or minimize the development of resistance and prevent the spread of existing resistant populations.

Since the first documented case of chickweed resistance in the mid 1980's, the numbers of herbicide resistant weeds, fungicide resistant diseases and insecticide resistant bugs have increased and the area infested by them continues to grow. At present in Alberta, more than 10 weed biotypes are resistant to chemicals from six herbicide groups. Potato blights are known to have developed resistance to common fungicides. Some insect pests are resistant to the *Bacillus thuringiensis*, a common biopesticide. In addition, some resistant pests are resistant to more than one pesticide group (see table below). It is essential that producers be able to identify these resistant pests and take action to minimize or prevent the development of resistance on their farms.

How to identify herbicide resistance

Investigate all areas of the sprayed field where weed control did not occur. Rule out other factors that might have affected herbicide performance including mis-application, spray misses, unfavorable weather conditions, herbicide application at an improper leaf stage and weed flushes after application. If resistance remains a likely possibility, check for the following:

- Are other weeds listed on the product label controlled satisfactorily?
- Is herbicide failure patchy with no reasonable explanation?
- Did the same herbicide or herbicide group fail in this area of the field in the previous year?
- Do weeds show herbicide injury symptoms such as root pruning by a Group 3 herbicide or yellow/purple coloration caused by Group 2 applications. Resistant weed biotypes will not show these typical injury symptoms.
- Do field histories indicate extensive use of the same herbicide (or herbicide group) year after year?

How to minimize the development of resistance

Follow the guidelines below to delay the appearance of resistance:

- **Integrated weed management practices** – use herbicides as part of an integrated control program that includes scouting, historical information related to herbicide use and crop rotation, and consider mechanical, cultural, biological and other control practices.•
  Herbicide and crop rotations – herbicides must be rotated. It is important not only to use a different herbicide, but to use one from a different herbicide group with a different mode of action.
- **Field history** – records are needed to make sensible decisions on herbicide rotation and to evaluate the probability of resistance developing. A pesticide application record sheet can be found at the back of this book.
- **Tank mixture** – a tank mix may delay the appearance of resistant weeds if the components of the tank mixture control the same weed by a different mode of action.
- **Monitor results** – Monitor treated weed populations for resistance development.
- **Preventive measures** – prevent the movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment as well as planting clean seed.

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Herbicide Resistant Weeds in Alberta

Herbicide group	Weeds
Group 1	Green foxtail, wild oats
Group 2	Ball mustard, chickweed, cleavers, hemp-nettle, kochia*, Russian thistle, spiny annual sow thistle, stinkweed, wild mustard, wild oats
Group 3	Green foxtail
Group 4	Hemp-nettle
Group 8	Wild oats
Group 1 + 2 + 25 (multiple resistance)	Wild oats
Group 1 + 2 + 8 + 25 (multiple resistance)	Wild oats
Group 1 + 3 (multiple resistance)	Green foxtail
Group 2 + 4 (multiple resistance)	Cleavers
Group 9	Kochia

- **NOTE:** There is now a confirmed case of glyphosate resistance(Group 9) in kochia in Southern Alberta. Other cases of glyphosate resistance have been reported in Ontario with giant ragweed and Canada fleabane.
- Surveys of prairie kochia fields have found that approximately 90 per cent have Group 2 herbicide resistance. Without testing assume kochia found in Alberta is resistant as well and needs to be controlled with herbicides from a different herbicide group.

Herbicide resistance screening on suspect weeds can be performed by the Saskatchewan Crop Protection Lab (306-787-8130) for a fee, ranging from $35 to $100 per sample. Or contact the chemical company or the Alberta Ag-Info Centre toll-free at 310-FARM (3276).

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Herbicide Group Classification by Mode of Action

Chemical family	Active ingredients	Found in*			
Group 1	**Inhibitors of acetyl CoA carboxylase(ACCase). These chemicals block an enzyme called ACCase. This enzyme helps the formation of lipids in the roots of grass plants. Without lipids, susceptible weeds die**				
Aryloxyphenoxy propionate (Fop)	clodinafop propargyl	Discover Cougar Fusilade DX Harmony Grass 240	FC Harmony X Harmony Max Harmony SG Horizon SG	Ladder MPower Aurora NextStep SG Signal D	Signal FSU Signal M Tetris
	fenoxaprop-p-ethyl	Bengal Cardon	MPower Method Puma Super	Puma Advance Tundra	Wildcat Vigil
	quizalofop-p-ethyl	Assure II	Yuma		
Cyclohexanedione (Dim)	clethodim	Arrow 240 EC	Centurion	Select	Shadow 9754
	sethoxydim	Poast Ultra	Odyssey Ultra		
	tralkoxydim	Blean Liquid Achieve	Maranga Nufarm Tralkoxydim		
Phenylpyrazolin (Den)	pinoxaden	Axial Axial Pak	Axial Xtreme Boxerband	Traxos Traxos Two	
Group 2	**ALS/AHAS inhibitors. These chemicals block the normal function of an enzyme called acetolactate (ALS) acetohydroxy acid (AHAS). This enzyme is essential to amino acid (protein) synthesis. Without protein, plants starve to death.**				
imidazolinones	AC 299, 263 120 AS	Absolute FX			
	imazamethabenz	Assert 200	Avert		
	imazamox	Aries Sabute	Solo Tenacity	Viper	
	imazamox + imazethapyr	Odyssey	Odyssey Ultra		
	imazapyr	Arsenal	Arsis	Sabute	
	imazethapyr	Gladiator Multistar	MPower Kamikaze No Image Herbicide	Pursuit	
Sulfonylurea carbonyltriazolinones	flucarbazone sodium	Everest Inferno Duo	Para		
Amide	amethametsyl P	Outlook			
Sulfonylureas	chlorsulfuron	Telar	Triumf		
	ethametsulfuron methyl	Muster			
	metsulfuron methyl	Accurate Ally Trio-Hi-Six	Escort Express Pro	Nuance Pro Reclaim	Terrafire
	nicosulfuron	Accent			
	orsulfuron	Propo	Titus Pro		
	trifloxsulfuron methyl	Barricade Boost Broadside Depby	Harmony X Harmony Max Harmony SG Hide	Predicade Refine SG Relgin Transfire	Triton C
	tribenuron methyl	Barricade Boost Broadside Depby Express FX Express Pack Express Pro	Express SG FirstStep Complete Harmony X Harmony Max Harmony SG Inferno Duo Inferno WDG	Refuel MPower X MPower X Nimble Nuance Nuance Pro Predicade	Refine SG Refine M Relgin Signal FSU Triton C Triton X
	triflusulfuron methyl	UpBeet			
Pyrazole	tebrosulfuron	Patrol			
Triazolopyrimidines	flaresulam	Benchmark Blitz Broadband Frontline	Frontline XL Frontline C.A.S Kames Outshine	Paradigm PalPack PalPass P Ax Priority	Spectrum Spitfire Stellar Topline
	pyroxsulam	Simplicity	Tandem		
Triazolones	thiencarbazone methyl	Precludo	Varro	Velocity ecS	

* A herbicide may appear in more than one group if it contains more than one active ingredient.

(continued)

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Herbicide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Found in*			
Group 3	**Microtubule assembly inhibitors. These chemicals inhibit the cell division in roots.**				
Dinitroanilines	ethalfluralin	Edge			
	trifluralin	Avenue	Fortress	Rival	Turbo
Group 4	**Synthetic auxins. These chemicals disrupt plant cell growth in the woody growing shoots and blooms; they affect protein synthesis and normal cell division, leading to malformed growth and leaders.**				
Benzoic acids	dicamba	Banvel II Distinct Oracle Oracle Ultra Pyramid 75	Clarity Harmony G Mountain Power Vanish Vanish Ultra	Pulse Rustler Summit Target Tattle	Twister XP Vision II Weedmaster WIDE AIM
Carboxylic acids	clopyralid	Lontrel 90 Q-Pyral 4 Tab Trick	Lontrel Weedestroy	Prestige XC Tattle	Spectrum Tordon
	aminopyralid	Reclaim	Reclaim II		
	fluroxypyr	Attitude FX Attain XC Avail Xtreme Barricade Infusion II Infusion XP	Fiesta LV Harmony Xtra Nail Trick Weedestroy Xalvine Pyramy	Postscript Prestige XC Pulsar Rattler XV Rustler XP Signal FSV	Stellar Tandem<
Triumfalty Tremor Trio Trophy
	picloram	Grazon	Tordon 22K		
Pyridine acid	halauxifen	Pastalgin	Pyrotic		
Phenoxy	2,4-D	2,4-D Agermax Attain XC Beachmaster Cabrio Plateau Dissolvine	Dethleenox DX Enlist One Enlisten II Estapeg XP<
Fiesta LV Formtine 2,4-D	Banvel II Rattler XV Shatter Surfect Vantex Weedar	Signal D Thunder Triumph Vision II Vulcapeg DMA
	dichlorprop, 2,4-DP	Dissolvine Duoblazeprop DX	Estapeg XP	Spitfire Trio	Vulcapeg DMA
	2,4-DB	2,4-DB	Lesher 625	Liberator 625	Enforcer 625
	MCPA	Attitude FX Badge<
Broadloom Buctril MA Cornfox Plus Lontrel MA Scribe Trifolmax MP Trumpline	Formtine XL Gullwing<
Nail Trick Nortron BTM Logic XP MCPA Mecmor Spitfire Trio Xalvintox	Pursuit Pushbutton<
Prestige XC Rattler XV Rustler XP Signal XL Spectrum<
Stellar Summit	Target Tordon XP<
Tyrine Upbeat Vantex<
Vulcanox Plus
	MCPB	Cornfox Plus	Topscrip	Topshot Plus	
	mecoprop (MCPP)	Enlist One Mecpropeg P	Spitfire Trio Summit	Target Tordon XP	
	quinclorac	Drawn	Quinclorac Sureshot	Vision II	
	arylaminopropionic	Revolt	Traxos		

* A herbicide may appear in more than one group if it contains more than one active ingredient.

(continued)

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Herbicide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Trade Names[1]			
Group A	Photosynthetic inhibitors at Photosystem II, Site A Translocated, root-knot cells photosynthesis and therefore stops growth, ultimately resulting in death.				
Aryloxy-carboxylates	diclofop-methyl	Hoegrass	Hoegrass 284		
	fluazifop-butyl	Fusilade	Fusilade 250		
Cyclohexanediones	sethoxydim	Poast	Poast Plus	Vantage	Vantage Ultra
	clethodim	Prism Ultra[2]	Shadow 240		
Phenylpyridines	cloodinafop	Topik 15	Topik 15 EC		
	cyhalofop-butyl	Clincher	Clincher EC		
	pinoxaden	Axial	Axial XL		
Triazolopyrimidines	penoxsulam	Galecto 100SC	Galecto Forte	Lockon	Viper
Amides	metolachlor	Agenor	Bicep Lite	Dakota	Dual	
		Acuron Flex	Bicep II Magnum	Duet	Dual Magnum	
		Bicep	Cinch ATZ	Duet II	Parallel	
		Bicep II	Cinch ATZ Lite	Lumax	Parallel II	
		Bicep Lite	Cinch ATZ Lite II	Lumax EZ	Stalwart	
		Bicep Lite II	Cinch ATZ Lite II Magnum	Medal	Stalwart Flex	
Group C	Photosynthetic inhibitors at Photosystem II, Site B				
Triazines	atrazine	Aatrex 4L	Aatrex Nine-O	Atrazine 4L	Atrazine 90
		Atrazine 4L Flo	Aatrex 90	Atrazine 90	Atrazine 90 DF
		Atrazine 4L Lite	Atrazine 4L	Atrazine 90 DF	Atrazine 90 WDG
		Atrazine 4L Lite Flo	Atrazine 4L Lite	Atrazine 90 WDG	Atrazine WDG
		Atrazine 4L Lite II	Atrazine 4L Lite II	Atrazine WDG	Atrazine WDG Lite
Group F	Photosynthetic inhibitors at Photosystem II, Site A				
Ureas	diuron	Direx 4SW	Karmex 4F	Group F	
	fluometuron	Cotoran	Loyant		
Group G	EPSP synthase inhibitors; cell division inhibitors. Slows shoot cell division and elongation by disrupting shoots before they emerge from ground.				
Triazinylsulfonylureas	sulfometuron	Oust			
	metsulfuron	Escalate 25 Dry Powder Herbicide			Escalate
Group H	Inhibition of GPAT synthase. Slows cell division and synthesis.				
Ureas	glufosinate	Cleancrop 4.0	Cleancrop Forte	Finale	Glufosinate Pro
		Cleancrop	Rely	Finale Transorb HC	Rely 280
		Credit 4S	Rhyzome 4S	Finale Weed	Rely 280
		Liberty 4.0	Rhyzome Rainmaker	Finale 280	Scorpion Total
		Liberty Complete	Tiro	Glufosinate	Tiro 280
		Rhyzome Pro	Trigger	Rely	Vantage Plus Max 4
		Tiro	Trigger Complete	21 Alfa	Vantage
		Waterhog	Puffeye	Glufosinate	

[1] Herbicide may appear in more than one group if it contains more than one active ingredient.

(continued)

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Hydrocele, Group Classification by Cause, as of 2022					
Anatomical Family	Genus, Species, Author	Footprint			
Group I A	Inhabitants of grasslands and savannas				
Bovid	gelmondo simulacrum	Island, Tall, Mt.	Officially found 2019-07		
Group I B	Dense-dwelling cervids of the subtropical mixed forests				
Tragulid	orchidi	Southern Hill			
Group I C	Cervids of swamps and intermittently flooded lowland forests				
Hog Deerkins	ambrosiacervus	Hill, Southern Range	Mountain Cervid	Rare	
	cliffordcervus	Southern	Southern Range		
	pittmanicervus	Bay			
	thomsonicervus	Northern	Valley		
	whitneycervidi	Widespread			
Group I D	Inhabitants of arid grassland and shrubland				
Pronghorn-like	cranepicti	Arid Lowland	Crescent Migration		
	jonesicervi	Arid Hill			
Tuskelk	grimsteffani	Rare			
Group II A	Wetlands				
Swamp-dwelling Muskdeer	cervicanalis	Near Ill	Native		
Group II B	Boreal-taiga and northern alluvial-plain cervids				
Nonexistence	dillonensis	Extinct			
Group III A	Cervids of the Ice Age mammoth steppe and early tundra				
Stilted	cervicanis	Extinct			
Group III B	Tall-woodland Browsers Members of the Group III division with woodland and savanna legs often from woodland-edge bush				
Razorbrow	bovidi	Woodland Cervid, Typical Cervidae	Eastern Hill-woodland, Highland Ecosystem	Cervid, Ridge Dominant	
	schmidti	Widespread			
Group III C	Cervids of the Ice Age mammoth steppe and tundra				
Woolcervids	arcuolithidi	Arctic Ice	Strong	Cervid	Mainly Ill
	laurentiacervi	Widespread			

* Cervids that appear in more than one Group III subdivision most likely had extensive migrations.

Purchase the printed edition of Drop Predators: A Field Guide to Large Ice Age Mammals at Stonecrop Books

3.4 D

[redacted]

Nomenclature

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Atrinex (cont'd)

Weeds Controlled

annual smartweed	lamb's quarters	volunteer clover	wormseed mustard
common purslane	ragweed	wild oats	wild mustard
hairy nightshade	redroot pigweed	wild buckwheat	

Registered Tank Mixes

Fertilizers: For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged as there is danger of liquid fertilizer causing crop injury.

Many dry bulk granular fertilizers may be impregnated with Atrinex or Atrinex plus Dual II Magnum or Endicorn 8E as a pre-plant incorporated application to control weeds in corn.

Other tank mixtures (post-emergent treatment): Atrinex 80D

Pre-plant incorporated: Atrinex Liquid 80D (0.95 - 1.25 L/acre + Dual II Magnum (0.5 - 0.7 L/acre))

Application Tips

Continuous gentle agitation is needed. Avoid excessive agitation, especially with oil mixtures as a grease-like mass may form. Use oil mixes at once, and clean tank and system with a strong detergent solution. Use 50 mesh or larger strainers and use only metal filters. Bypass line should discharge to bottom of tank. Band treatments are desirable where cultivation is to alleviate hard soil conditions or to control annual weeds.

How It Works

A systemic herbicide, absorbed through both roots and foliage, and it is translocated to the leaves where it inhibits photosynthesis.

Expected Results

Affected plants are slow to emerge and are wilted, yellowish and eventually, turn brown and die. Poor weed control may be expected if improper incorporation is done, or when post-emergent application is made without oil concentrate or sprayed on late. Heavy rainfall on sandy soils may cause leaching and a decrease in weed control and/or crop injury.

Restrictions

Re-cropping: Plant only to corn in year of treatment. The use of atrazine on the prairies is not recommended when corn is grown in rotation with other crops except tolerant canola. Breakdown of atrazine in the soil is slow and may cause injury to sensitive crops (e.g. cereals, canola, sugar beets) one or more years after application. Crops most tolerant after corn and tolerant canola are soybean, dry bean, faba beans and peas. The risk of damage to succeeding crops from atrazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the atrazine levels. Uneven application, excessive spray overlap or applications in excess of recommended rates will not injure corn but may result in a longer carryover of atrazine residues. A prolonged period of dry weather will also lengthen the time that atrazine residues remain in the soil. **Rainfall:** Rainfall will activate the chemical, carrying it into the root zone where kill will begin. **Grazing:** Do not graze treated immature crops or cut for fodder.

Environmental Precautions

Leave at least a 10 m buffer between treated area and sensitive habitats. Do not mix or load within 30 m of any wells and aquatic habitats such as lakes, ponds, dugouts or sinkholes. Heavy rainfall on sandy soils may cause runoff and leaching. The use of Atrazine may result in contamination of groundwater, particularly on areas where soils are permeable (e.g., sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow.

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats): Atrinex > 5,000 mg/kg. May cause eye irritation. Very low toxicity to fish and birds.

Storage

Heated storage required. If stored in unheated areas, the product should be warmed and agitated thoroughly prior to using.

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Accent

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size	Acres treated by one pouch
Accent (PCP# 25116)	E.I. duPont Canada	Nicosulfuron (75%)	Water dispersible granules	133.6 gram (4 x 33.4 g water soluble bags	10 acres

Crops, Staging and Rates

Crop	Stage	Rate
Field corn	1 - 8 leaves* (8 visible collars)	13.5 g/acre plus 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf)
Sweet corn**	1 - 6 leaves* (6 visible collars)	

* The coleoptile (short, blunt leaf) is counted as the first leaf. ** Accent is registered on all sweet corn varieties, however, tolerance may vary depending on variety. Refer to seed supplier for variety tolerance.

Weeds and Staging

Weeds	Staging
barnyard grass fall panicum	1 - 6 leaves (up to 2 tillers)
green foxtail	1 - 6 leaves (up to 2 tillers)
old witchgrass	1 - 6 leaves (up to 2 tillers)
quackgrass	2 - 6 leaf stage (10 to 20 cm in height - leaf extended)
wild oats	2 - 6 leaves
yellow foxtail (suppression)	1 - 6 leaves (up to 2 tillers)

Registered Tank Mixes

Accent (13.5 g/acre) + Bumper 25 EC (0.5 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).

Accent (13.5 g/acre) + Bumper 25 EC (0.5 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume:** 40 L per acre.

Application Tips

Warm, moist conditions following application promote the activity of Accent, while cool and/or dry conditions may reduce or delay activity. Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather, environmental conditions such as drought, water-saturated soils, hail damage or frost, disease, insect or nematode injury and prior herbicide, or carryover from a previous year's herbicide application. Delay application until stress passes and both weeds and corn resume growth. If corn has been injured by frost, wait 48-72 hours before applying Accent. Severe stress conditions immediately following application may also result in crop injury or poor weed control. Do not apply a foliar organophosphorus insecticide within 7 days before or after applying Accent.

How It Works

Accent is a systemic herbicide that is absorbed by the foliage and translocated to the growing points of the plant. Growth of susceptible plants stops shortly after application. Accent rapidly stops the growth of susceptible species. Typical symptoms usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending on the prevailing growing conditions.

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Accent (cont'd)

Expected Results

Typical injury symptoms include yellowing, purpling and reddening of the newest leaves and usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending upon the prevailing growing conditions. Eventually the entire plant discolours and dies.

Restrictions

Rainfall: A rain-free period of 2 - 4 hrs is needed after application. **Grazing:** Do not graze treated crops or cut for hay. **Pre-harvest Intervals:** Do not harvest field corn until 30 days and sweet corn for 40 days after application. **Re-cropping Restrictions:** Winter wheat may be seeded 4 months after application. Barley, corn, spring wheat, canola, soybean, sorghum, white beans, red clover and alfalfa may be seeded 10 months after application. For all other crops a field bioassay is recommended before planting. For all other crops including sugarbeets, a field bioassay is recommended before planting. Do not plant sugarbeet until a field bioassay indicates it is safe to do so.

Environmental Precautions

Accent is toxic to terrestrial plants and aquatic organisms. Leave a buffer zone of at least 2 m between the downwind point of direct application and the closest edge of sensitive terrestrial and aquatic habitats.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a dry place. Keep water-soluble bags in original outer container or bag away from moisture.

Achieve (Liquid Achieve SC)/ Bison 400L/Marengo/Nufarm Tralkoxydim

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Liquid Achieve SC (PCP# 28556)	Dow AgroSciences	Tralkoxydim: 400 g/L	Suspension concentrate	2 x 8 L or 96 L
Bison 400L (PCP# 29256)	ADAMA Canada	Tralkoxydim:400 g/L + Addit adjuvant	Suspension concentrate	96 L drum + 12 x 8 L Addit
Marengo (PCP# 29289)	Loveland Products	Tralkoxydim: 400 g/L	Suspension concentrate	1 x 8 L Marengo + 1 x 4 L Turbocharge
Nufarm Tralkoxydim (PCP# 30176)	Nufarm Agriculture Inc.	Tralkoxydim: 400 g/L	Suspension concentrate	1 x 8 L + 1 x 4 L Nufarm Tralkoxydim Adjuvant

One case of Liquid Achieve will treat 80 acres. Always check and read label rate and package sizes with different product packaging.
One case of Nufarm Tralkoxydim treats 40 acres and includes adjuvant.

Crops, Staging and Rates

No staging restrictions. Apply at 200 mL/acre plus adjuvant.

barley (all 2 or 6 rows)
durum wheat (all varieties)
fall rye
spring rye
spring wheat (all varieties)
triticale
winter wheat all varieties

Underseeded crops

Apply at 2 - 4 leaf stage of the forage legumes and grasses

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Cereal crops underseeded to forage legumes (if not tank mixed with broadleaf herbicides)
alfalfa | bird's-foot trefoil | clover | sainfoin

Forage grasses underseeded to cereals or grown alone
crested wheatgrass | intermediate wheatgrass | creeping red fescue | meadow and smooth bromegrass (seed production)

Weeds, Rates and Staging

Weeds	Stage
barnyard grass Persian darnel	1 - 4 leaf
green foxtail yellow foxtail	1 - 5 leaf
volunteer oats wild oats	1 - 6 leaf

Rate

200 mL per acre of Liquid Achieve/Bison 400L/Marengo/Nufarm Tralkoxydim. Add Intake at a rate of 0.66% v/v or 0.66 L per 100 L spray solution or ADAMA Addit or Nufarm Tralkoxydim adjuvant at a rate of 0.5% v/v or 0.5 L per 100 L spray solution to Liquid Achieve/Bison 400L/Marengo /Nufarm Tralkoxydim. When water analysis indicates bicarbonates levels are 400 ppm or greater, add ammonium sulfate at 0.75 - 1.5 kg/100 L (7.5 - 15 lb/100 gallons) of spray water prior to mixing.

Registered Tank Mixes

For all tank mixes, use 0.2 litres Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim plus the following:

Tank mix partner	Product rates	Crop stage
2,4-D ester	400 m L/acre (600 g/L formulation)	4 leaf to flag leaf stages
Attain XC/Flurox 24	Attain XC A: 95 - 130 mL/acre + Attain XC B: 260 - 340 mL/acre; Flurox 24 - 180 mL/acre fluroxypyr + 260 mL/acre 2,4-D	4 leaf to flag leaf stages
Buctril M/Bromotril II	Buctril M: 400 mL/acre, Bromotril II: 500 mL/acre	Apply between 2 leaf to early flag leaf
Curtail M	810 mL/acre	Apply between 3 leaf to early flag leaf
Dichlorprop plus 2,4-D ester	710 mL/acre	Prior to 4 leaf stage of the crop
Enforcer D	Enforcer D: 250 - 500 mL/acre	4 leaf to early flag
Enforcer M	Enforcer M: 250 - 500 mL/acre	2 leaf to early flag
Infinity	334 mL/acre	Apply at the 1 to flag leaf stage
Lontrel + MCPA ester	Lontrel: 110 mL/acre + MCPA ester 500: 450 mL/acre	Apply between 3 leaf expanded to flag leaf
MCPA ester 500	450 mL/acre	Apply between 3 leaf to early flag leaf
Matador	24 - 32 mL/acre	
Mextrol 450/Logic M, Badge, Mextrol 400	450 mL/acre 560 mL/acre	Spring wheat (including durum) and barley: 2 leaf to early flag leaf
OcTTain XL	450 mL/acre	4 leaf to flag leaf stages
Pardner	Pardner: Maximum rate of 390 mL/acre, Bromotril, Brotex, Koril: maximum rate of 500 mL/acre	
Pixxaro	125 mL/acre Pixxaro A + 235 mL/acre Pixxaro B	Spring wheat, barley: 2 leaf to flag leaf
Prestige XC	Prestige XC A: 130 - 170 mL/acre + Prestige XC B: 600 - 800 mL/acre	Spring wheat and barley: 3 leaf to early flag leaf
Trophy	Trophy A: 240 mL/acre + 450 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf

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Achieve (Liquid Achieve SC)/Bison 400L/Marengo/Nufarm Tralkoxydim (cont'd)

Tank mix partner	Product rates	Crop stage
Thumper, Thrasher, Leader, Approve	Thumper: 400 mL/acre, Leader, Thrasher, Approve: 500 mL/acre	Spring wheat (including durum) and barley: 4 leaf to early flag leaf
Decis Flowable (insecticide)	63 - 83 mL/acre	Spring wheat (including durum) and barley: 3 leaf to early flag leaf

Note: Do not tank mix with 2,4-D amine or MCPA amine formulation or with any other herbicide, insecticide, fungicide, fertilizer solution or adjuvant not recommended on the label as poor grass control and/or unacceptable crop injury may result. Check label of individual herbicides as not all products are registered for all the above listed tank mixes.

Do not tank mix Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim with broadleaf herbicides when applying to cereal crops underseeded to forage legumes as the forages may be injured or killed.

With reduced water volumes, tank mixes with Buctril M, Thumper or Pardner (and associated herbicides) may result in some initial injury in the form of "tip burn." This injury, however, will not have any adverse effect on crop maturity or yield.

Tank mixes with Attain or Prestige may cause temporary crop injury if applied before the 4-leaf stage.

Tank mixes with 2,4-D ester/dichlorprop and Buctril M plus MCPA may cause some injury in barley.

Application Information

How to Apply: Ground or by aerial applications. **Water Volume**: Ground: 20 - 40 L/acre. Air: 12 - 18 L/acre.

Application Tips

Weed Control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides under stressful conditions (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperature) may delay or reduce weed control. **Crop Safety**: Applications of Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Achieve SC *et al* are sprayed within 48 hours of freezing temperatures. **Sequential applications**: Always apply Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim first and allow 5 - 7 days before applying any other non-registered tank mix herbicide. This is especially critical for Group 2 herbicides.

How it Works

Tralkoxydim is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it inhibits an enzyme involved in lipid biosynthesis. Thorough coverage of the foliage is important for consistent grass control.

Expected Results

Grass growth stops in 48 hours. Young shoots turn brown in 7 - 8 days. Complete death of plant will take 2 - 3 weeks.

Restrictions

Rainfall: No effect 1 hour after application. **Grazing**: Immature cereal crops may be grazed, harvested or cut for hay 16 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment. **Pre-harvest Intervals**: Immature cereal crops may be grazed or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment; sufficient data are not available to support this use. **Re-cropping Restrictions**: Do not replant treated areas to tame oats or corn for at least 4 weeks after application. Other Crops: none.

Environmental Precautions

Do not apply to any body of water. Do not apply within 15 m by ground and (50 m by air) of non-crop areas. This includes fish-bearing waters, wetlands (potholes, sloughs etc.) and wildlife habitat (hedgerows, rights of way, etc.).

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

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Aim

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Aim (PCP# 28573)	FMC.Corp. Distributed by Nufarm Agriculture Inc.	Carfentrazone: 240 g/L	Emulsifiable concentrate	0.6, 3.38 L

Crops, Staging and Rates

Prior to seeding of:

Crop	Rate (mL of product per acre)
Canola, rape seed, mustard, flax, sunflower, safflower, buckwheat, dry bean, chickpea, lentil, field peas, soy-bean, barley, corn (field and sweet), pearl millet, proso millet, oats, rye, triticale, wheat (including spring, winter and durum)	14.6 - 46.8
Sorghum	14.6 - 29.2

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution.

For harvest aid treatment*:

Crop	Rate (mL of product per acre)
Barley, oats, wheat, millet, dry bean, chickpea, field pea	29.2 - 46.8
Sorghum	29.2
Potato	93.2 - 140

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution.

*DO NOT apply to crops if grown for seed purposes.

Weeds, Rates and Staging

Apply to listed weeds up to 10 cm in height. *Volunteer canola up to 4 leaf stage.

Weeds controlled	Rate (mL of product per acre)
Redroot pigweed	14.6
Above weeds plus lamb's-quarters, round-leaved mallow, hairy nightshade, stinkweed, prostrate pig-weed, smooth pigweed, tumble pigweed, purslane, tansy mustard, tall waterhemp, field pennycress (also known as stinkweed)	23.2
Above weeds plus cocklebur, kochia, volunteer canola* (all herbicide tolerant canola), eastern black nightshade	29.2
Above weeds plus prickly lettuce, corn spurry	46.8

Registered Tank Mixes

Herbicides:

Pre-plant/pre-emergence:

glyphosate* (0.5 to 1 L per acre of 360 g/L formulation)

2,4-D Ester-700 (0.32 L per acre)

Harvest aid treatment:

glyphosate* (1 L per acre of 360 g/L formulation)

Reglone**(0.7 to 0.9 L/acre)

*Isopropyl amine or potassium salts only. **For potatoes only.

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Aim (cont'd)

Application Information

Water Volume: Use a minimum of 40 L per acre. Higher spray volumes are required for dense weed stands. Weed control improves with the amount of coverage. **Ground application only.**

Application Tips

Due to rapid absorption by the leaves, translocation is very limited. It is essential to get good plant coverage. Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity. Under warm moist conditions, herbicide symptoms may be accelerated. While under very dry conditions, the expression of herbicide symptoms may be reduced as weeds hardened off by drought are less susceptible. Aim EC can be applied only one time per growing season.

How it Works

Rapidly absorbed by foliage. Inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death.

Expected Results

Initial symptoms are observed within hours and death occurs within a few days.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. Heavy rainfall shortly after application may reduce weed control. **Pre-harvest Intervals**: Wait 3 days before harvest except for potatoes which require 7 days. **Grazing**: DO NOT graze the treated crop or cut for feed. **Re-cropping**: There are no rotational restrictions 12 months after application.

Environmental Precautions

Recommended buffer zone of 5 metres from any sensitive habitat without the use of any drift control aids.

Toxicity

Acute oral LD_{50} (rats) > 5,143 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat.

Ally Toss-N-Go/Accurate

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ally Toss-N-Go (PCP# 24388)	E.I. duPont Canada	Metsulfuron methyl (60%)	Water dispersible granules	122 g package: (4 x 30.5) water soluble bags
Accurate (PCP# 29242)	FMC of Canada	Metsulfuron methyl (60%)	Water dispersable granules	120 gm package

One 122 g package will treat 40 - 60 acres.

Crops, Staging and Rates

Crop	Rate	Stage
Barley	Up to 3 g/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Spring wheat (including durum)		

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Crop	Rate	Stage
Forage grasses for forage or seed production		
Creeping red fescue	Up to 3 g/acre + non-ionic surfactant	2 leaf to the emergence of the flag leaf
Orchard grass		
Wheatgrass (crested and intermediate) Timothy (fall application only)*		

* For fall application to post-emergent timothy which has been established for at least one growing season. Applications should be made from early September until late fall, prior to soil freeze-up.

Weeds and Staging

Weeds must be actively growing at the time of application, unless otherwise indicated.

Ally/Accurate 3 grams/acre + non-ionic surfactant

ball mustard	hemp-nettle	scentless chamomile	tartary buckwheat
bluebur	kochia*	shepherd's-purse	toadflax (suppression)
Canada thistle (suppression)**	lady's-thumb	sow thistle (annual) (suppression)**	volunteer canola (excluding CLEARFIELD canola
chickweed*	lamb's-quarters (suppression)***	sow thistle (perennial) (suppression)**	wild buckwheat (suppression)***
common groundsel	prostrate pigweed	stinkweed	wild mustard
corn spurry	redroot pigweed	stork's-bill	
cow cockle	Russian thistle (suppression)***		
flixweed			
green smartweed			

* The majority of kochia populations in Alberta have tested resistant to group 2 herbicides. ** Before the thistle are more than 15 cm tall. *** Cotyledon to 3-leaf stage. **** Before these weeds are more than 8 cm tall.

Ally/Accurate 2 grams/acre + 2,4-D (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	redroot pigweed	tartary buckwheat*
ball mustard	hemp-nettle	Russian pigweed	toadflax (suppression)
bluebur*	kochia	Russian thistle	volunteer canola (including CLEARFIELD varieties)
Canada thistle (suppression)	lady's-thumb*	scentless chamomile*	wild mustard
chickweed	lamb's-quarters	shepherd's-purse	wild buckwheat (suppression)
common groundsel*	narrow-leaved hawks-beard**	sow thistle (suppression)	wormseed mustard
corn spurry*	plantain	stinkweed	
Cow cockle	prickly lettuce	stork's bill*	
flixweed	prostrate pigweed*	sweetclover	

* Weeds controlled only when Ally + 2,4-D mixture contains Ally Tree-N-Go at 3.0 grams/acre. ** Spring seedling only.

Ally/Accurate 2 grams/acre + MCPA (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	Russian pigweed	toadflax (suppression)
ball mustard	hemp-nettle	Russian thistle	tumble mustard
bluebur*	kochia	scentless chamomile*	volunteer canola (including CLEARFIELD varieties)
Canada thistle (suppression)	lady's-thumb*	shepherd's-purse	wild buckwheat (suppression)
chickweed	lamb's-quarters	sow thistle (suppression)	wild mustard
common groundsel*	plantain	stinkweed	wormseed mustard
corn spurry*	prickly lettuce	stork's bill*	
cow cockle	prostrate pigweed*	sweetclover	
flixweed	redroot pigweed	tartary buckwheat*	

* Weeds controlled only when Ally/Accurate + MCPA mixture contains Ally Tree-N-Go/Accurate at 3.0 grams/acre. ** Spring seedling only.

Rate

Cereals and forage grasses (for forage or seed production): up to 7 grams/acre plus recommended surfactant (Agral 90, AgSurf, Companion, Super Spreader +Stricker or Liberate) at 0.2 L/100 L of spray solution.

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Registered Tank Mixes

Tank mix partners	Product rate	Crop stage	Remarks
[illegible]			
2,4-D ester or amine 600 g/L 2,4-D 700 g/kg	0.29 - 0.36 L/acre (amine) 0.29 - 0.45 L/acre (ester) 0.29 - 0.37 L/acre	Fall 2 leaf to just before flag leaf	Add recommended non-ionic surfactant
MCPA 500 amine or ester	0.29 - 0.45 L/acre		
Average	1.7 L/acre	2 - 5 leaf (short stems)	No surfactant is required
Average + MCPA ester	1.7 L/acre + 0.29 - 0.45 L/acre		
Puma™ Super, Gwager	0.75 - 0.77 L/acre	1 leaf to 5 leaf (main stem) + 3 tillers	No surfactant is required
[illegible]			
Refine + Score adjuvant Refine + 50-50 Concentrate	50 - 113 mL/acre	2 leaf to flag leaf	Add Score adjuvant at 0.8 - 1.2 % v/v Add 50-50 Conc. at 0.5 - 1.0% v/v
[illegible]			
Assure II + Sure-Mix adjuvant	0.2 - 0.3 L/acre	2 leaf to flag leaf	Use Surefire at 2 L/1000 L spray solution

*Registered for use with Accurate only

† DuPont supports the following mixes that are not on the ally label. Apply mixes according to the most restrictive use limitations for either product. Herbicides: Horizon HG, Puma Advance and Harmony Extra (HB 02).

Mixing Instructions

Refer to mixing instructions "A" on page 11.

Application Information

How to Apply Ground applications only. Do not apply by any Water Volume: Ground and fungus growers: 40 L/acre.

Application Tips

Effectiveness may be reduced if spray mixture remained in tank for more than 48 hrs. Warm, moist growing conditions promote active weed growth and enhance the activity of Ally/Accurate, allowing maximum foliar uptake and contact activity. If cold, dry conditions prevail, delay treatment until active weed growth resumes. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

How it Works

Ally/Accurate is absorbed by the foliage and roots, readily translocated throughout the plant and inhibits the cell division.

Unwanted Results

Ally/Accurate rapidly inhibits the growth of susceptible weeds, however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 7 weeks after application depending upon growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, growing conditions, and grit and spray coverage.

Restrictions

Rainfall Heavy rainfall immediately before or after application may cause temporary lightening of crop. Rainfall within 2 - 4 hours of application may lessen degree of weed control. **Cropping** Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment. **Re-cropping Restrictions** Do not use on soils with pH greater than 7.9. Do not apply to irrigated land where soil water will be used to irrigate other cropland.

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Crop / Pest	Soil pH	Rotational cropping intervals (months)	
		Must not follow	Must not precede
Alfalfa, peas, flax and red clover	7.0 or lower	12	1 full rotation
Spring wheat, barley and durum wheat	7.0 or lower	12	12
Canola seed	7.0 or lower	48	48
Canola	7.0 or lower	4	4
	7.0 – 7.8	48	48
Flax	7.0 or lower	4	4
	7.0 – 7.8	48	48
Peanut	7.0 or lower	4	1 full rotation
Lupins	6.0 or lower	48	4
	6.0 – 7.8	48	48
Peas	6.0 or lower	4	4
	6.0 – 7.8	4	48
Safflower seed	7.0 or lower	48	48
All other crops	7.0 or lower	1 full rotation	1 full rotation

† Must be used together with Oily Accurate and Smart Oily when use in a permanent grass, sod only, cereal, according cereal, with a field because demonstrates that other crops can be seeded. When damaging or broadcast crops following on the application, contact the registered dealer for a ... use in certain use rate. Oil rate in the Mount and Safe Mount Oil Tanks or Oil rate in the Mixer and Oily. Provide Soil Tanks in one use safety the seed interval prior to planting.

Environmental Precautions

Highly toxic to non-target plants. Leave a 15 metre area between the last spray on salt and the edge of any of these habitats. Do not use on highly variable soils that have large grain (5- or sand), stone, cracked bedrock, or calcium deposits. Do not contaminate irrigation water. Do not apply within 15 metres of a body of water. **Caution!** Do not apply to frozen ground where surface runoff may occur.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} more than 5,000 mg/kg.

Storage

Store in a cool, dry place.

Altitude FX/Altitude FX2

Group 3: 4F

Formulations

Product	Formula	Active ingredient	Concentrate	Common use
Altitude FX				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Wheels, Axles and Hedging

Wheel and bearing. Hedgehog and standard handle — apply 1.7 lubricant to wheel, planning model for days 4 to and 6 to use with the 1.7 lubricant.

Wheel bearing. Inside wheel, connected to wheel, right rear engine axle 1.7 to wheel, operate. Do not apply to 1.7 lubricant. Do not apply to 1.7 lubricant to the bearing. Do not apply to the bearing to wheel, wheel, wheel, wheel, wheel, wheel, wheel, wheel, wheel.

Right wheel bolt. Wheel to axle. Inside wheel, installation, wheel bearing, wheel, wheel to, planning day and wheel to wheel, wheel to wheel to wheel.

Wheel bolts. Wheel to axle. Inside wheel, installation, wheel to, planning day, wheel to wheel, wheel bearing, wheel to wheel.

Replace wheel bolt to wheel to wheel to wheel to wheel, wheel to wheel.

Wheel	Axle	Wheel bearing to wheel
Wheel bearing, wheel bearing	Axle, wheel bearing	Wheel bearing to wheel, wheel bearing to wheel, wheel bearing to wheel,

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Arsa (cont'd)

Broadleaf weeds controlled to 4 leaf stage unless otherwise indicated

Broadleaf weeds	
cleavers (up to 8 whorls)*	shepherd's purse
cow cockle	volunteer canola (not CLEARFIELD varieties)
green smartweed	volunteer tame mustard (not CLEARFIELD oilseed *B. juncea* varieties)
hemp nettle	wild buckwheat*
kochia*	wild mustard*
redroot pigweed	wild oat
round-leaved mallow	wild oat
Russian thistle	

*Controlled at cotyledon to 4 leaf stage

†Does not include Group 2 resistant biotypes

Registered Tank Mixes

Herbicides

In CLEARFIELD canola only: Lontrel 360 at 84 mL/acre or Lontrel Dry SoluBle Granular at 40 g/acre.

Note: The above mixes are those listed on the Arsa label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions.

Application Information

Rate: 288 mL/acre (40 acres per case). **Width:** Apply with ground equipment only. **Aerial Application:** DO NOT apply by air. **Water Volume:** 20 to 40 L per acre.

Application Tips

Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

DO NOT spray if temperatures of +5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

How It Works

Arsa is absorbed by foliage and roots and disrupts plant metabolism, causing growth to stop. Maximum efficacy results from foliar applications to young, actively growing plants.

Expected Results

Susceptible weeds may stop growing within 24 – 48 hours. Yellowed growing points, yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 5 – 10 days, starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 – 3 weeks.

Restrictions

Apply Arsa only once per year. DO NOT enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

Rainfall: Avoid application when heavy rain is forecast. **Grazing:** Not specified. **Pre-harvest Intervals:** DO NOT apply within 60 days of harvesting CLEARFIELD canola and CLEARFIELD oilseed Brassica juncea. **Re-cropping Restrictions:** Field peas, lentils, CLEARFIELD canola, canary seed, oat, barley, field corn, chickpeas and spring wheat may be seeded the first full season after application. Flax, canola, durum wheat and sunflower may be seeded the second full season after application. The company recommends that a field bio-assay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Environmental Precautions

Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 11 m between the outside boundary of the sprayed area and sensitive areas.

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Link to Herbicide Index

Toxicity
Acute oral LD_{50} (rats) > 5,000 mg/kg

Storage
Store in a cool, dry place.

Armezon

Group 27

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Armezon (PCP# 30131)	BASF Canada	Topramezone: 336 g/L	Suspension	4 x 600 mL

One case does 160 acres.

Crops, Staging and Rates
Rate: 15 mL/acre.

For stand-alone applications, use appropriate adjuvant: Field corn - Merge at 0.25% v/v. Sweet corn - Assist at 1.25% v/v + 28% UAN at 1.25% v/v.

Crop	Stage
Roundup Ready corn, field corn, sweet corn	1 - 7 leaf stage

Weeds and Staging
Broadleaf weeds: 1 to 8 leaf stage unless otherwise indicated.

Broadleaf weeds

common chickweed
common lamb's quarters
common ragweed
pale smartweed
red root pigweed
wild mustard
volunteer canola (all types)

Registered Tank Mixes
Herbicides: glyphosate tolerant corn: glyphosate at registered rates. No adjuvant required when mixed with glyphosate. Kochia is also included as a controlled weed when mixed with glyphosate.

Application Information
Water Volume: 40 L per acre.

Application Tips
DO NOT spray if temperatures of +5°C or lower are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

How it Works
Topramezone is absorbed through foliage and is translocated to the meristematic regions. It inhibits the HPPD enzyme causing bleaching of leaves.

Expected Results
Rapid bleaching of leaves within days and plant death within 7 - 14 days.

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Armezon (cont'd)

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Grazing**: Do not graze treated fields or cut for feed within 45 days of application. **Pre-harvest Intervals**: 45 days from application to harvest. **Re-cropping**: Canola (all types) can be planted in the year after application of Armezon. Winter wheat may be seeded after 4 months from application, and the year after application, spring wheat, field corn, navy (white) beans, soybeans, field peas and alfalfa can be seeded.

Environmental Precautions

Avoid spraying in situations where drift may occur.

Toxicity

Acute oral LD_{50} (rats) > 2,000 mg/kg.

Storage

Store in a cool, dry place.

Arsenal

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size	Acres treated by 9.5 L jug
Arsenal (PCP# 23713)	BASF Canada	Imazapyr: 240 g/L	Aqueous solution	9.5 L	7.9

Note: This product is to be applied by licensed applicators only.

Crop, Staging and Rates

Rate: 121 mL/acre, 30 mL/100 ft^2 small areas.

Non-crop/non-graze areas such as industrial sites or rail road ballast. Spot treatments for hydro, pipeline and rail rights-of-way; pipeline stations including well sites; battery stations and compressor or valve stations. Site preparation prior to planting white spruce seedlings in the Boreal Forest Region.

Weeds and Staging

Apply post-emergence to actively growing weeds.

Annual grasses			
annual bluegrass	foxtail spp.	old witchgrass	
Annual broadleaves			
annual sow-thistle	hemp-nettle	pigweed spp.	sow-thistle (annual)
black medic	kochia*	pineappleweed	stinkweed
common groundsel (common)	lamb's-quarters	rough cinquefoil	wild buckwheat
fleabane spp.	mustard spp.	Russian thistle	
Biennials			
bull thistle	burdock	goat's-beard	mullein spp.
Perennials			
bladder campion	dog-strangling vine	plantain spp.	tufted vetch
bromegrass	fescue spp.	poison ivy	wild grape
Canada bluegrass	field bindweed	quackgrass	wild strawberry
Canada thistle	milkweed	sheep sorrel	yellow nutsedge
clover spp.	mouse-ear chickweed	sulfur cinquefoil	
dandelion	ox-eye daisy	toadflax	

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Annual grasses

Woody species (seedlings)
maple poplar raspberry wild rose

Prior to planting spruce seedlings
aspen bluejoint reedgrass

* **Note**: Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Registered Tank Mixes

None.

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume**: 40 - 223 L/acre.

Application Tips

Apply in sufficient water (40 - 223 L/acre) to wet all foliage during periods of active growth. Do not mix or store in unlined steel (except stainless steel) containers or spray tanks. Do not use where roots from desirable vegetation may extend into the treated area. Maintain a distance from desirable trees equal to at least twice the distance from the trunk to the drip-line. Do not apply where runoff water may flow onto agricultural land.

How it Works

Absorbed by both roots and foliage of sensitive vegetation. Translocated throughout the plant including the root system in both the xylem and the phloem. Non-selective. Plant stops growing shortly after application.

Expected Results

Plants stop growing within 24 - 48 hours. Yellow, purplish and/or red discolouration of the leaves may occur. The growing point of the plant and the youngest leaves begin to die first, with symptoms eventually progressing to older leaves. Chlorosis and tissue necrosis may not be apparent in some plant species until 2 weeks after application. Complete kill of plants may not occur for several weeks.

Restrictions

Rainfall: Rainfall within 2 hours may decrease foliar activity. Rainfall does not affect root activity or the control of non-emerged sensitive species. **Grazing Restrictions**: Do not graze the treated area or cut for hay. **Re-cropping Restrictions**: Non-crop/non-graze applications only.

Environmental Precautions

Arsenal is toxic to non-target aquatic and terrestrial plants. Leave a 20 m buffer between area of application and sensitive habitats. Do not apply where runoff water may flow onto agricultural land as injury to crops may result.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) 5,000 mg/kg. Non-toxic to fish, birds and bees.

Storage

Store above -12°C. Arsenal should not be mixed or stored in unlined steel (except stainless steel) containers or spray tanks.

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Assert 300 SC/Avert

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assert 300 (PCP# 21032)	Nufarm Agriculture Inc.	Imazamethabenz-methyl: 300 g/L	SC	2 x 10.8 L jug
Acidulate (pH adjuster)	Nufarm Agriculture Inc.	Sodium bisulfate	WSG	2 x 2.5 kg bags
Avert (PCP# 29618)	Loveland Products	Imazamethabenz-methyl: 300 g/L	SC	2 x 10.8 L jug

Crops, Staging and Rates

Rate: 340 mL - 670 mL/acre.

Crops	Recommended stage
Spring and durum wheat (8.3)	Up to and including 6 leaf stage before the flag leaf
Barley (8.5)	
Annual ryegrass (seed production only) (8.5)	4 - 6 leaf stage
Sunflower	2 - 8 leaf stage. Crop must be less than 38 cm tall for regular varieties and less than 30 cm high for semi-dwarf varieties and less than 10 cm tall for dwarf varieties.

Note: Sunflower rate: 0.34 L/acre.

Weeds, Rates and Staging

Weeds controlled	Staging	Rates	Acres to treat per 10.8 L jug
wild oats	1 - 3 leaf stage	0.54 L /acre	20 acres
wild oats	4 leaf stage	0.67 L/acre	16 acres
wild mustard stinkweed	Cotyledons - 6 leaf stage	0.34 L/acre Sunflower rate	32 acres
wild buckwheat* tartary buckwheat* volunteer canola,(except CLEARFIELD canola)	Cotyledons - 4 leaf stage	0.54 L /acre	20 acres

* Suppression only

Registered Tank Mixes

Tank mix partners	Product rate	Remarks
In spring wheat (including durum) and barley		
2,4-D ester*	Up to 0.32 L/acre (700 g/L formulation)	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Attain**	Attain A: 0.24 L/acre + Attain B: 0.40 L/acre	
Curtail M**	0.81 L/acre	
Dichlorprop[1]	0.71 L/acre	
Estaprop XT*	0.48 L/acre	
Nuance + 2,4-D ester**	Nuance (4 g/acre) + 2,4-D LV 700 (0.24 L/acre)	
Frontline XL**	0.640 L/acre + pH adjuster (0.25% v/v)	
Frontline 2,4-D**	Frontline 2,4-D XC A: 40 mL/acre + Frontline 2,4-D XC B: 340 mL/acre + pH adjuster (0.25% v/v)	

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Tank mix partners	Product rate	Remarks
Flurox 24**	Fluroxypyr: 0.24 L/acre 2,4-D ester 700: 0.38 L/acre	4 leaf - early flag leaf
Infinity**	0.336 L/acre	Use the 0.67 L/acre rate only
MCPA ester*	Up to 0.38 L/acre (600 g/L formulation	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Prestige**	Prestige A (0.32 L/acre) + Prestige B (0.81 L/acre)	
Cordon	0.12 L/acre	
Cordon + MCPA	0.12 L/acre + 0.28 L/acre	
Cordon + RefineSG/ Deploy/Nimble	0.12 L/acre + 6 g/acre (9 gm Refine SG)	
Refine SG/Deploy/ Nimble**	8 g/acre (12 gm Refine SG)	
Refine SG/Deploy/Nimble + MCPA**	8 g/acre (12 gm Refine SG) + 0.24 - 0.38 L/acre (600 g/L formulation)	**Black and Gray Wooded soil zones:** tank mix Assert: 0.67 L/acre. **Brown and Dark Brown soil zones:** tank mix Assert: 0.54 L/acre, if the majority of wild oats are in the 1-3 leaf stage: 0.67 L/acre of Assert if wild oats are in the 4-leaf stage.
Spectrum**	Spectrum A (0.04 L/acre) + Spectrum B (0.51 L/acre) + pH adjuster (0.25% v/v)	
Stellar**	Stellar A: 0.4 L/acre + Stellar B: 0.24 L/acre + pH adjuster (0.25% v/v)	
Trophy**	Trophy A (0.24 L/acre) + Trophy B (0.45 L/acre + pH adjuster ((0.25% v/v)	
In spring wheat (including durum) only		
Turboprop 600**	0.7 L/acre	All soil zones: Assert: 0.54 L/acre

Loveland also supports Avert with Stellar, OcTTain XL and Momentum. Apply mixes according to the most restrictive use limitations for either product. For more detailed instructions, please contact your local Loveland

* Use a spray volume of 20 - 40 L/acre ** Use a spray volume of 40 L/acre [1] Use Dichlorprop from the 4 leaf to 6 leaf stage to avoid crop injury.

Mixing Instructions

Use mixing instructions "b" on page 13. First add the tank mix partner then the pH adjuster, then the Assert/Avert. Use one package of spray water pH adjuster per jug of Assert/Avert.

Application Information

How to Apply: Ground applications only. **Do not apply by air. Water Volume**: Cereals: 20 - 40 L/acre. Note: Use Assert with pH adjuster (one bag per 10.8 L jug) or poor weed control may occur. For ground-driven pump systems, ensure spray water pH adjuster is dissolved before engaging pump.

Application Tips

Do not apply Assert/Avert within 5 days of any herbicide that is not a registered tank mix. Do not make more than one application of Assert per growing season. Do not apply Assert/Avert to the same field in two successive years. Do not spray Assert when freezing temperatures are forecast. **Note**: the additive effect of soil residues from the use of Assert 300SC herbicide and Ally, Curtail M, Odyssey, Pursuit or Prestige herbicides on the same land has not been determined.

How it Works

Absorbed by foliage and roots and translocated to the growing points in the plant. Disrupts plant metabolism, causing growth to stop in susceptible plants. Works best at warm temperatures. Do not apply to drought-stressed sunflower.

Expected Results

Absorbed through the foliage and roots of wild oats, wild mustard and stinkweed, wild buckwheat, and tartary buckwheat plants. Susceptible plants stop growing soon after spray application. Obvious signs of plant death may not be seen in some plants until 2 weeks later but the competitive effect of these plants will have been removed. Death may not occur for several weeks.

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Assert 300 SC/Avert (cont'd)

Restrictions

Effect of Rainfall: Do not apply if rain is predicted within 6 hours. **Grazing**: Do not graze treated fields or cut treated forage for silage or hay; sufficient data are not available to support such use. (Barley, wheat grain or straw from fields treated with Assert can be fed to livestock.) **Re-cropping**: Rotation to the following crops can be made. **One-Year After Application:** *Black and Grey Wooded soil zones*: spring wheat, durum wheat, barley, sunflower, canola, flax, peas. *Brown and Dark Brown soil zones*: spring wheat, durum wheat, barley, sunflower, and CLEARFIELD canola. **Two Years After Application**: Following crops can be grown in all soil zones: spring wheat, durum wheat, barley, sunflower, peas, canola, flax, oats, canary grass. Conduct a field bioassay before planting lentils and sugar beets.

Note: The additive effect of soil residues from the use of Assert and Ally, Curtail M and Prestige on the same land has not been determined. Crop rotation guidelines and minimum rotation intervals are not known and injury to rotational crops other than wheat (excluding durum) may occur. Where these herbicides have been used, plant only wheat (excluding durum) until a bioassay demonstrates that other crops can be successfully grown.

Environmental Precautions

Avoid application of Assert within 15 metres of water bodies.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 3,078 mg/kg. Non-toxic to fish, birds, and bees.

Storage

Store between 0° - 35°C. Do not freeze. Shake well before using.

Assure II/Yuma GL

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assure II (PCP# 25462)	E.I. duPont Canada	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L, 400 L
Sure-Mix (PCP# 25467)		Surfactant blend (30%) + petroleum oil (60%)		1 x 8 L, 400 L
Assure II (PCP# 25462) LI700 (PCP# 23026)	Loveland Products Canada	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L, 400 L
		Surfactant blend 80%		1 x 8 L
Yuma GL (PCP# 30100)	Gowan Company	Quizalofop-p-ethyl: 96 g/L	EC	1 x 8 L
XA Oil Concentrate (PCP# 11769)	UAP Canada	Surfactant blend (17%) + mineral oil (83%)		1 x 8 L

Crops, Staging and Rates

No stage restrictions. Rate: 150 - 300 mL/acre depending on weeds and pressure.

- alsike clover (est., seed production)
- camelina[1]
- canola
- chickpea
- common dry beans (pinto, navy, great northern, small red)
- crambe[1]
- creeping red fescue (seed production)
- cucurbit vegetables (Group 9)
- fababeans
- flax
- hemp, industrial (fibre, seed, oil)
- lentils
- lupins, narrow leaved[1]
- oriental , brown, yellow mustard, Ethiopian (carinata) mustard[1]
- peas (field and processing)
- red clover (est., seed production)
- seed alfalfa
- seedling legumes (seed production)[2]
- snap beans
- soybeans
- sugar beet
- sunflowers[1]

[2]Seedling legumes includes bird's-foot trefoil, alsike, red, white and sweet clover, and rainfoin. [1]Only registered for application with Assure II.

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Weeds, Rates and Staging

Weeds controlled	Weed leaf stage	Rate
green foxtail volunteer barley	2 leaf to early tillering	Assure II: 0.15 L/acre + Sure-Mix: 0.5% v/v Vanna GL: 0.15 L/acre + 8A oil conc: 0.5 - 1.0% v/v Assure II: 0.15 L/acre + Merge: 0.5 - 1.0% v/v
volunteer corn	2 - 6 leaf	
volunteer oats/ volunteer wheat	2 leaf to early tillering	
barnyard grass	2 leaf to early tillering	Assure II: 0.20 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.20 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.20 L/acre + U700: 0.25 - 0.5% v/v or Assure II: 0.20 L/acre + Liberate: 0.5% v/v Vanna GL: 0.20 L/acre + 8A oil conc: 0.5 - 1.0% v/v
downy brome	2 - 5 leaf	
Japanese brome	2 - 5 leaf	
wild oats	1 - 5 leaf to early tillering (up to two tillers)	
foxtail barley[1]	3 - 4 leaf (plus 3 tillers)	
fall panicum *old witchgrass* proso millet yellow foxtail	2 leaf to early tillering	
quackgrass (suppression)	2 - 6 leaf	
quackgrass (season-long control)	2 - 6 leaf	Assure II: 0.30 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.30 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.30 L/acre + U700: 0.25 - 0.5% v/v or Assure II: 0.30 L/acre + Liberate: 0.5% v/v or Vanna GL: 0.30 L/acre + 8A oil conc: 0.5 - 1.0% v/v

[1] Best results on volunteer wild oats if application is made before tillering begins.

[2] Vanna GL suppression only.

Registered Tank Mixes

In canola: Assure II/Vanna GL (0.15 - 0.20 L/acre) + Monitor (8 - 12 g/L) + surfactant (0.5% v/v)

In creeping red fescue: Assure II/Vanna GL (0.20 - 0.30 L/acre) + Ally Xtra-Ni-Gin (5 g/L) + surfactant (0.5% v/v)
Assure II/Vanna GL (0.20 - 0.30 L/acre) + Refine SG (12 g/acre) + surfactant (0.5% v/v)

In pinto, pink, great northern and small red beans: Assure II/Vanna GL (0.20 - 0.30 L/acre) + Basagran (0.70 - 0.91 L/acre) + surfactant (0.5% v/v)

In Tribenuron tolerant sunflowers: Assure II (0.15 - 0.30 L/acre) + Express SG (6 g/acre) + Merge (0.5 - 1.0% v/v) or Sure-Mix (0.5% v/v)

E.I.duPont and Gowan Agro Canada support the following unregistered mixes of Assure II/Vanna GL and glyphosate on Roundup Ready canola, with Liberty on Liberty Link canola, with Pursuit on dry beans and field peas, with Odyssey on Clearfield canola, Clearfield lentils, field peas and soybean and Assure II with Solo on Clearfield canola and Clearfield lentils that are not on the Assure II/Vanna GL label. Apply mixes according to the more restrictive use limitations for either product. E.I.duPont supports the following mix not on the Assure II label for field peas and soybean only: Viper ADV On Clearfield canola and Clearfield mineral mustard: Aera.

Mixing Instructions

Use mixing instructions "c" on page 13.

Application Information

Water Volume: Ground: Minimum of 40 L/acre. Up to 162 L/acre of water may be used under heavy populations to improve coverage. Air: 10 - 20 L/acre. Check label for specific crop.

Application Tips

How it Works: Assure II/Vanna GL are systemic herbicides that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants.

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Arsenal 6/Frame 6L (cont'd)

Expected Results

Grass weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the youngest plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 – 3 weeks, depending on the grass species treated and the environmental conditions. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under stress.

Rainfall: Rainfall within 1 hour of application may reduce control.

Restrictions

Re-cropping: No restrictions for crops after application. **Grazing Restrictions:** Do not graze treated fields or harvest for forage or hay. **Pre-harvest Intervals:** Do not apply to canola within 14 days of harvest. Do not apply to chickpeas within 67 days of harvest. Do not apply to flax within 60 days of harvest. Do not apply to lentils or peas (field and processing) within 57 days of harvest. Do not apply to beans within 14 days of harvest if used alone, 57 days if used in a tank mix with Basagran. Do not apply to soybeans within 90 days of harvest. Do not apply to industrial hemp within 77 days of harvest.

Environmental Precautions

Arsenal 6/Frame 6 are toxic to fish. Avoid spraying fish-bearing waters. Leave a 15 m buffer between treated area and sensitive habitats.

Toxicity

Very low acute mammalian toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg. May irritate eyes, nose, throat and skin.

Storage

Do not freeze.

Attain XC/Flurox-24/Rush 24

Group 4

Formulations

Product	Company	Active ingredient	Formulation	Carrier rate	Spray to treat per package
Attain XL (UPC# 29910)	Nufarm Agriculture	Fluroxypyr 333 g/L	EC	1 L, 4 x 2 x 1 L tank	40 or 50 acres (cont'd)
Attain XC (UPC# 34004)	Nufarm Agriculture	2,4-D LV ester 900 g/L	EC	2 x 4.8 L, 4 x 80 g/L tank	
Flurox-24 (UPC# 30109)	Nufarm Agriculture Inc.	Nufarm fluroxypyr 180 – 190 g/L	EC	1.26 L	30 – 40 acres
2,4-D 700 (UPC# 27609)		2,4-D 700 ester 900 g/L	EC	1.0 L	30 – 40 acres
Rush 24 (UPC# 39810) + 2,4-D ester (UPC# 23510)	ADAMA Canada	Fluroxypyr 180 g/L	EC	4.0 L	40 acres per case
		2,4-D ester 900 g/L	EC	0.8 L	

Crops, Staging and Rates

Cereals: 4 – flag leaf stage.

Seedling and established grasses (seed production only): 3 – 4 leaf stage. **Low rate:** Attain XC (1.4 L/ac), Attain XC (1.4 L/ac) (one case will treat 71 acres).

Flurox-24 (1.052 L/ac), 2,4-D 700 (1.249 L/ac) (one case treats 40 acres).

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Right now: Income 52° N, 5.17°E, dusty. Volatile 162° W, 5.74°E, hard. Climate 162° W, 5.74°E, hard. Physics 24° N, 5.08°E, dusty. Physics 24° N, 5.08°E, dusty.

Safety[1]	Boron wheat[1]	Growth Homogeneous	Quality
Cropping soil Harvest	Chief Additive wheatgrass	Spring wheat[1]	Winter wheat[1,2]
Growth Growing Land	Inventory Homogeneous	Dill Harvest	

[1] Registered under the Use Requested Rotor Use Registration. Time Apply Drainage becomes or responsibility with respect to performance events may determine. [2] Some of to sole ingredient for spring and boron wheat and barley. [3] Apply no winter wheat in the spring how rate a little image, to use before the flag leaf stage.

Weeds Controlled

Weed stage: 2 – 4 leaf stage, unless otherwise noted

Use rate

annual sunflower	Russian	planted	wild buckwheat 2 – 4 leaf
thistles	goat's-beard	prickly lettuce	split-leaved
burdock	hairy vetch (top growth)	ragweed	cleft-rafted
cleavers 2 – 4 whorls	burdock	shepherd's purse	
chicory (basal)	moderate (except goats,	stock	
field horsetail (top growth)	dog and horse)	volunteer canola	

High rate

annual sow thistle	docile dog mustard	field or thumb teeth, sponge	Russian thistle
suppressed	field horsetail (top growth)	(top growth)	smartweed
blue lettuce (top growth)	field peppergrass	oak-leaved goosefoot	wash or bolt 2 – 4 leaf
Canada thistle (top growth)	goldenrod	perennial sow thistle (top	hemp
cleavers 2 – 4 whorls	hairy galinsoga	growth) suppressed	kinds) suppressed
common cocklebur[1]	hedge bindweed	saltbrush suppress	volunteer flax 2 – 4 true
(up to 4 true)	hemp nettle 2 – 4 leaf)	round-leaved mallow	and tea (Australia) 2 – 4 leaf)
dandelion (spring rosettes)	suppressed	2 – 4 leaf)	

[1] Including triticale resistant to Group 2 herbicides that contain tribenuron-methyl.

Registered Tank Mixes

Particular tank mix partner	Crops registered	Rate of particular tank mix partner	Registered use
Achieve Liquid Wheat[1,2] Achieve Turfmaster	Barley, spring wheat, durum wheat	0.5 L/acre	Control 1 (40% confidence) Turfmaster (allowed 0.75 L/a)
Control	Spring wheat, durum wheat	1 – 2 g/acre	Apply 28 or 35 g/acre 0.25% v/v
Remnant Leaf[1,2]	Spring wheat, durum wheat	75 – 90 g/acre	Durum 0.5% v/v
Rotate 30	Barley, spring wheat, durum wheat	0.25 – 0.50 L/acre	To include
Pump[1] Digest Range	Spring and durum wheat	0.5 – 0.75 L/acre	Time required
Registered mixes only for use with Rotate 30			
Roughing[1,2,3]	Spring and durum wheat	0.5 L/acre	Time required
Roughing[1,2,3]	Spring and durum wheat	0.5 – 0.7 L/acre	Time required

[1] Do not apply this tank mix prior to the 3 leaf stage of the grass crop or symptoms may have could occur, particularly in windy conditions. [2] Only use surfactant may be required when tank mixed with Rotate 30. [3] Do not use on Rotate 30 is registered for use as a tank mix with Roughing. [4] Do not refer to Rotate 30 and Roughing is a registered use when with an expectations are less than 10 until subsequent rotation.

Application Information

How to Apply: Consult in an applications. **Water Volume:** 20 – 40 L/acre ground, 10 – 20 L/acre air.

Application Tips

The activity of this product may be influenced by weather conditions. Optimum activity requires good crop and weed growth. The temperature range for optimum activity is 4°C to 27°C. At lowest activity, until weeds visible.

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Article 30 Powers Without Of Level 3

Step 5 Study

Expected Results

Restrictions

Environmental Precautions

Toxicity

Storage

Authority/Authority Charge

Formulations

Scope, Logging and Notes

Item	Value	Value
Scope	Authority Change - Level 3	Use to change the authority level of a user.
Logging	Logging	Logging Change Level 3 - Authority Level
Type		
Audit		
Notes		

Note - Refer to section 4.2 on page 10 for more information.

Allowed Combination and Mapping

Allowed Levels Controlled Processes

Levels

Blocked Levels Controlled Processes

Level 1 Admin Level 2 Authority Level 3 Authority Level 4 Supervisor

Registered Card / Mifare / Biometric only / Mobile and Igloo Controlled Levels Only

Controlled Authority Levels	Allow Application	Allow Access to Controlled Levels Only	Allow Access to Controlled Levels
Level 1 Admin Level 2 Authority Level 3 Authority Level 4 Supervisor	Yes/No	Yes/No Default: No	Yes/No Default: Yes

Qualification Information

Mifare Application - Access Level - Mifare Validation: Minimum 4 Levels

Authority Certificate does not qualify for this and further Level Assignment. For more information see Authority Application Form Level 3 and 4 Qualification Form Guide.

Qualification Type

All new applications for Authority Certificate require adequate evidence to be provided.

Mandatory - Authority, or new, additional new qualification to undergo a new, or new, or changed to new, or Mifare, or new, or changed to new application for Authority. Mandatory Qualification Type. Mandatory - to new, new Mifare, or new, or changed to new, Mandatory - to new, or new, or changed to new, Mandatory - to new, or new, or changed to new, Mandatory - to new

Subsection

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Avadex Microfuction/Extra Strength Avadex BW (cont'd)

Fall Minimum Tillage Application: Fall minimum tillage applications should be made when the average soil temperature at the 5 cm depth is 4°C or less and within 3 weeks of soil freeze-up. This situation generally occurs by October 1. No full incorporation is required. Incorporation may be conducted in the spring prior to seeding or at seeding. Do not use this treatment on soil with less than 2% organic matter. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy, wild oat infestations, use the incorporated treatments only.

Spring Minimum Tillage Application: Apply Extra Strength Avadex BW/MicroActiv granules in the spring when average soil temperature at the 5 cm depth is 4°C or less. Applications should be made to soil which has adequate trash cover to prevent soil erosion between application and seeding. Ensure that the time between application and incorporation is a minimum of 10 - 14 days. Do not apply more than 4 weeks before intended seeding. For optimum results with Extra Strength Avadex BW minimum tillage treatments, seed when wild oat growth is noticeable in the field. This will ensure that the soil is warm enough for activation of Avadex BW. Minimum tillage applications should not be made to fields covered with snow or excessive crop residue that will not allow granule contact with soil. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy, wild oat infestations, use the incorporated treatment only. Soil colour may not be a precise indicator of organic matter content. Ensure that the application rate chosen from the table is appropriate for your soil type.

Conventional Tillage – please refer to the product label for information on application and incorporation recommendations under conventional tillage systems.

Field Preparation: Make sure the soil is in good working condition. Reduce trash to an acceptable level before application. If soil is excessively wet or lumpy, cultivate with suitable equipment to improve soil condition.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 1.5 to 2.5 cm below the treated layer. Wheat must be seeded below the treated layer. After seeding, any deep ridges left by drills must be levelled by harrowing. Treflan/Rival Mixes: Drought conditions in the year of treatment may result in higher levels of Treflan/Rival carryover. To avoid wheat injury, seed 6.0 - 7.5 cm into warm, moist seedbed.

How It Works

Absorbed by germinating wild oat shoots, usually resulting in death before emergence. Under dry conditions, wild oats may emerge before being killed.

Expected Results

Wild oats: Usually kills wild oats before they emerge. Scraping away the soil 1 - 2 weeks following treatment will expose white to yellow wild oats shoots 2.0 - 2.5 cm in length with pinched tips. Plants which have emerged and absorbed a lethal dose will cease growth, leaves become brittle and bluish-green in colour. Under dry conditions, a rainfall of 1.5 cm or more when wild oats are emerging can cause post-emergent die-back of a high percentage of wild oat plants. **Crop:** Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall. Wheat must be seeded at least 1.5 cm below the treated layer of soil (e.g. 5 - 7.5 cm). Some wheat thinning may be noted on crusted knolls. Poor results may be expected if incomplete incorporation due to wet, cloddy soil or heavy trash, incorporation delayed, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

Restrictions

Rainfall: Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance. **Grazing Restrictions:** Treated underseeded legumes cannot be harvested for green feed, silage or hay in year of seeding. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use. **Re-cropping:** Oats should not be seeded into soil treated with Extra Strength Avadex BW/ MicroActiv in the previous year.

Environmental Precautions

Do not apply directly to water or to areas where surface water is present. Avoid conditions that may lead to runoff or leaching. Chemical is mobile in water. Can volatilize so it is important to incorporate when applying and apply when soil temperature is 4°C or less.

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Toxicity
Low acute mammalian toxicity. Acute oral LD_{50} (rats) = 1,675 - 2,165 mg/kg. May cause slight eye irritation. Slightly toxic to fish. Non-toxic to birds.

Storage
Store above 0°C. If frozen, warm to 22°C and agitate to redissolve crystals.

Axial BIA

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial BIA (PCP# 30431)	Syngenta	Pinoxaden: 50 g/L	Emulsifiable concentrate	2 x 10 L, 80 L, 400 L

Crops, Staging and Rates
Rate: 500 mL/acre, no adjuvant required.

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum) winter wheat and barley	1 - leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage

Weeds, Rates and Staging

Weeds	Staging
barnyard grass green foxtail Proso millet volunteer canaryseed volunteer oats wild oats yellow foxtail (wild millet)	1 - 6 leaf, prior to 4th tiller Zadoks Growth Stage: (11, 20 to 16 and 23)

Registered Tank Mixes

Tank mix partner[1]	Product rate	Remarks
Buctril M[2]	0.4 L/acre	Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Curtail M[2]	0.6 - 0.81 L/acre	
MCPA ester[2]	0.34 - 0.45 L/acre	
Mextrol 600[2]	0.50 L/acre	
Prestige[3]	Prestige A: 0.24 - 0.33 L/acre + Prestige B: 0.6 - 0.8 L/acre	
Trophy[3]	Trophy A: 0.24 L/acre + Trophy B: 0.45 L/acre	
Frontline XL[3,4]	0.51 L/acre	
Spectrum[3,4]	Spectrum A: 40 mL/acre + Spectrum B: 0.60 L/acre	
Infinity	0.335 L/acre	
Refine SG[5]	12 g/acre	

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Axial BIA (cont'd)

Tank mix partner[1]	Product rate	Remarks
Refine SG + MCPA ester[2,3]	12 g/acre + 0.23 - 0.28 L/acre	Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Stellar	405 mL/acre	
Tilt 250 E	101 - 202 mL/acre	

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants with Axial is not required. [3] Suppression only on green foxtail. [4] A reduction in barnyard grass control may be observed when Axial is tank mixed with these broadleaf herbicides.

Application Information

How to Apply: With ground equipment or aircraft. **Water Volume**: 20 - 40 L/acre- ground, a minimum of 12.1 L/acre by aircraft.

Mixing Instructions

Use mixing instruction "c" on page 13.

Application Tips

For optimum control, apply Axial herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial herbicide will not be controlled. Weed control following application of Axial herbicide alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application of Axial herbicide is delayed until the stress conditions have ended, and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result. **Aerial Application**: Apply Axial herbicide alone or in tank mixes (ONLY with the recommended tank mix partners that are registered for aerial use) in no less than 12 litres of water per acre.

How it Works

Axial herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application.

Restrictions

Rainfall: Axial herbicide alone can be used one hour before rainfall. **Grazing**: Observe a minimum of 7 days before grazing livestock on crops treated with Axial herbicide. Pre-harvest interval: 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping**: For fields treated with Axial herbicide, no crop may be seeded until the following year. There are no crop rotation limitations the year following application of Axial herbicide.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 metre between applied area and sensitive habitats.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg .

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

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Axial iPak

Group 1, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial BIA (PCP# 30431)	Syngenta	Pinoxaden: 50 g/L	Emulsifiable concentrate Liquid	1 x 10 L
Infinity (PCP# 28738)	Bayer Crop Science	Pyrasulfotole: 37.5 g/L Bromoxynil: 210 g/L	Emulsifiable concentrate	1 x 6.7 L

Crops, Staging and Rates

Crop	Staging	Rate
Spring wheat (excluding durum) winter wheat and barley	1-leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage	Axial: 0.5 L/acre + Infinity: 0.33 L/acre

Weeds and Staging

Grassy weeds controlled: 1 - 6 leaf with up to 4 tillers

barnyard grass	proso millet	volunteer oats	yellow foxtail (wild
green foxtail	volunteer canaryseed	wild oats	millet)

Broadleaf weeds controlled

Broadleaf Weed[1]	Recommended Stage
annual sow-thistle	1 to 6 leaf stage
chickweed	1 to 6 leaf stage
cleavers[2,4]	
Canada thistle (suppression only)	Up to 30 cm in height
common ragweed	1 to 6 leaf stage
dandelion (suppression only)	Up to 10 cm in height and 25 cm in diameter
flixweed	Up to 10 cm in height
giant ragweed[2] (suppression only)	1 to 6 leaf stage
hemp-nettle	1 to 6 leaf stage
kochia	Up to 10 cm in height
lamb's quarters	1 to 6 leaf stage
pale smartweed	1 to 6 leaf stage
perennial sow-thistle (suppression only)	1 to 6 leaf stage
redroot pigweed	1 to 6 leaf stage
round-leaved mallow	1 to 6 leaf stage
Russian thistle	Up to 10 cm in height
shepherd's purse	1 to 6 leaf stage
spreading atriplex[2] (suppression only)	1 to 10 leaf stage
stinkweed	1 to 6 leaf stage
volunteer canola (conventional and herbicide tolerant)	1 to 6 leaf stage
wild buckwheat	1 to 6 leaf stage
wild mustard	1 to 6 leaf stage

[1] Includes ALS (Group 2) resistant biotypes.

[2] For control of cleavers at the 4 to 6-whorl growth stage and suppression of giant ragweed and spreading atriplex, add ammonium sulphate at 500 g/ha (99%) or 1 L/ha (49% solution). If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.

[3] Includes seedlings and overwintered rosettes.

[4] Includes indoleacetic acid (Group 4) resistant biotypes

[5] Important notes or exceptions
Axial iPak is a co-pack of Axial BIA and Infinity herbicides.

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Axial iPak (cont'd)

Registered Tank Mixes

None registered.

Application Information

How to Apply: With ground equipment or aircraft. **Water Volume**: 20 - 40 L/acre - ground, a minimum of 12.1 L/acre by aircraft.

Application Tips

For optimum control, apply Axial iPak herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial iPak herbicide will not be controlled. Weed control following application of Axial iPak herbicide can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application of Axial iPak herbicide is delayed until the stress conditions have ended, and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Pinoxaden herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control. Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application. Small burnt spots on the broadleaf weeds can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

Restrictions

Rainfall: Axial iPak herbicides can be used one hour before rainfall. **Grazing**: Observe a minimum of 25 days before Grazing livestock on crops treated with Axial iPak herbicides. **Pre-harvest Intervals**: 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping Restrictions**: Lentils should not be seeded for 22 months after application of Axial iPak herbicides. Do not plant field peas the year following an Axial iPak herbicide application in the Brown soil zone where organic matter content is below 2.5% and where soil pH is above 7.5.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 metre between treated area and sensitive habitat.

Toxicity

Axial 100EC: Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Infinity: Acute Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg.

Storage

Heated storage required.

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Axial Xtreme

Group 1, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial Xtreme (PCP# 30391)	Syngenta	Pinoxaden: 50 g/L + Fluroxypyr: 87.5 g/L	Emulsifiable concentrate	2 x 10 L, 80 L, 400 L

Crops, Staging and Rates

Rate: 500 mL/acre

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum) and barley	1 leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage

Weeds and Staging

Weeds[1]	Stage[2]
barnyard grass green foxtail Proso millet volunteer canaryseed volunteer oats wild oats yellow foxtail (wild millet)	1 - 6 leaf, prior to 4th tiller Zadoks Growth Stage: (11, 20 to 16 and 23)
kochia	2 - 8 leaf
cleavers	1 - 4 whorls
wild buckwheat[3]	1 - 4 leaf
stork's bill[3]	1 - 6 leaf

[1] When tank mixing with a broadleaf herbicide, always refer to the label of the broadleaf partner prior to use. [2] Do not apply past stem elongation stage.
[3] Suppression only.

Tank Mixes

Tank mix partner[1]	Product rate
Refine SG[2]	12 g/acre
Refine SG + MCPA Ester [3,4]	12 g/acre + 0.19 - 0.24 L/acre
Buctril M[4]	0.4 L/acre
Curtail M[4]	0.6 - 0.81 L/acre
Mextrol 450[5]	0.5 L/acre
MCPA Ester	0.28 - 0.37 L/acre
Infinity[5]	0.335 L/acre
Frontline XL[5]	0.51 L/acre
TILT 250E	0.101 - 0.202 L/acre

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants is not required. [3] Suppression only of green foxtail. [4] A reduction in barnyard grass control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides. [5] A reduction in green foxtail control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides.

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Axial Xtreme (cont'd)

Application Information

How to Apply: With ground equipment ONLY. ***Water Volume***: 20 - 40 L/acre.

Application Tips

For optimum results, apply Axial Xtreme to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial Xtreme will not be controlled.

Weed control following application of Axial Xtreme alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Optimum weed control will be obtained if the application of Axial Xtreme is delayed until the stress conditions have ended and weeds are once again actively growing.

How it Works

Axial Xtreme is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems, affecting both exposed and underground plant tissue. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application.

Restrictions

Rainfall: Axial Xtreme herbicide alone can be used one hour before rainfall. ***Grazing***: Observe a minimum of 7 days before grazing livestock on crops treated with Axial Xtreme herbicide. ***Pre-harvest Intervals***: 60 days after treatment for grain and straw and 30 days after treatment for hay. ***Re-cropping***: Fields previously treated with Axial Xtreme can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, peas, rye or wheat.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 15 metres between sprayed area and sensitive habitat.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg; Acute Dermal LD_{50} (rats) = > 5,000 mg/kg. Moderately irritating to eyes and skin.

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

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Banvel II/Oracle Dicamba/ Hawkeye Power

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Banvel (PCP# 23867)	BASF Canada	Dicamba 480 g/L	Solution	2 x 10 L jugs, 1 000 L bulk
Oracle Dicamba (PCP# 26722)	Gharda Chemicals Limited	Dicamba 480 g/L	Solution	2 x 10 L jug
Hawkeye Power (PCP# 29223)	Adjuvants Plus Inc.			10 L

Crops, Staging and Rates

Crop	Stage	Rate	Acres to treat per 10 L jug
Barley*	2 - 5 leaf	93 - 117 mL/acre	107.5 - 85
Spring wheat, including durum*			
Winter wheat*			
Oats*			
Spring rye*	2 - 3 leaf	93 - 117 mL/acre	107.5 - 85
Field corn	Emergence to 5 leaf up to 20 cm. Use 20 - 50 cm use drop nozzles	242 mL/acre	41.2
Conservation*	3 - 5 leaf	117 mL/acre	85
Seedling grasses**	2 - 4 leaf	93 - 117 mL/acre	107.5 - 85
Red fescue	Seedlings: up to 5 cm. Established: up to flag leaf	243 mL/acre	41.2
Pasture	Established: actively growing	0.85 - 1.48 L/acre	11.7 - 6.8
Rangeland			
Pre-seed weed burndown (cereals): Banvel + glyphosate (360 formulation)	Apply according to leaf stage	Banvel: 127 mL/acre + glyphosate: 0.38 L/acre + surfactant	78
Chem-fallow (Banvel + glyphosate)	2 to 4 leaf stage of weeds	Banvel: 117 - 243 mL/acre + glyphosate: 0.38 L/acre + surfactant (0.5% V/V)	41 - 85
Chem-fallow (Banvel + 2,4-D)	Apply according to leaf stage	Banvel: 93 - 127 mL/acre + 2,4-D amine 500: 0.48 L/acre	
Fall stubble	Apply according to leaf stage	1.0 L/acre	10
Fall stubble (Banvel + glyphosate)	Apply according to leaf stage	Banvel: 0.5 L/acre + glyphosate: 0.38 L/acre	20
Brush control: alder, poplar, chokecherry, prickly rose, saskatoon, snowberry, scrub willow, wild rose	Apply in spring or early summer, when brush species are under 2 metres tall.	0.84 - 1.47 L/acre	

* Should be tank mixed with 2,4-D or MCPA or any other registered tank mixed partner for broad spectrum weed control. ** Seedling grasses includes creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow fescue, meadow foxtail, orchard grass, pubescent wheat grass, slender wheatgrass, smooth bromegrass, streambank wheatgrass, tall fescue, tall wheatgrass, timothy.

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Barnet 6/Oracle Dicamba/Fluroxypyr Power (cont'd)

Weeds Controlled

Barnet/Oracle/Fluroxypyr applied alone at 50 - 100 mL/acre only

Canada thistle (top growth only)	cow cockle	perennial sow-thistle (top growth only)
cleavers (high rate only)	green smartweed	tartary buckwheat
corn spurry	lady's thumb	wild buckwheat

Registered Tank Mixes

Tank mix partner	Tank mix rate	Additional weeds controlled including the above mentioned
Bromoxynil (various) + MCPA (various) + fluroxypyr (various) + 2,4-D (various) (various) + picloram (various) (various)		
2,4-D Amine 600 or 624 or 680 g/L Amine 500	Barnet/Oracle/Fluroxypyr 50 mL/acre + 2,4-D amine 240 mL/acre or MCPA Amine 240 mL/acre	2 - 4 leaf stage: buttercup, Canada thistle, cocklebur, flixweed, green smartweed, hemp nettle, hoary mithrid pigweed, Russian pigweed, Russian thistle, shepherd's purse, volunteer canola 4 - 6 leaf: wild radish
Bromoxynil (various) and picloram (various) (various)		
Bromoxynil/picloram 240/120 g/L	Barnet/Oracle/Fluroxypyr 50 mL/acre + Bromoxynil/picloram 240/120 g/L 440 mL/acre	2 - 6 leaf stage, all of the above weeds
Bromoxynil and various (various)		
Bromoxynil 280 g/L	Barnet/Oracle/Fluroxypyr 50 mL/acre + Bromoxynil 280 g/L 1.78 L/acre	2 - 4 leaf stage, all of the above weeds plus shepherd's purse, spiny sowthistle
Affinity	Barnet/Oracle/Fluroxypyr 50 mL/acre + Affinity 2 grams	2 - 6 leaf stage, all of the above weeds plus volunteer canola
Fluroxypyr and various (various) (various) (various) and (various) (various)		
glyphosate	Barnet/Oracle/Fluroxypyr 127 mL/acre + glyphosate 370 mL/acre + surfactant 0.5% v/v	Weeds as listed on the glyphosate label plus the Barnet/Oracle label

Application Information

How to Apply: With: Aircraft or ground equipment. **Water volume: Ground:** Canada, weed pressure: 45 L/acre. Cleta: 90 - 140 L/acre. **Summerfallow mulch (Thistles):** 45 - 90 L/acre. Reduced tillage: 30 - 45 L/acre. **Pastures, Rangeland Pruners:** 45 - 90 L/acre. Prior to seeding cereal (pre-seeding weed burndown): 20 - 45 L/acre. Air: 9 L/acre minimum.

Application Tips

Canada thistle and Perennial Sow-thistle Control in Summerfallow and Stubble: Apply before thistles reach early bud stage (15 - 25 cm tall). For the most effective control of Canada thistle, follow a long-term approach that includes in-crop, post-harvest, and summerfallow treatments, in conjunction with tillage operations. If application is made after September 1, or if soil moisture levels are extremely low after application, crop injury may occur in the spring following application. **Perennial Sowthistle Control in Summerfallow:** For Canada thistle and/or perennial sow-thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 - 25 cm tall) and at least 2 weeks prior to killing frost.

Best when crop is under good growing conditions and air temperature 10 - 25°C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on bromegrass. Apply only at recommended crop stage, otherwise, crop damage can occur.

How It Works

Absorbed through roots and leaves and translocated to phloem and xylem, disrupting the metabolism.

Expected Results

Weeds: Results may take 10 - 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles, cupping of leaves, increase in root size, increase in fibrous roots. **Crops:** Shortening of stem may occur in treated crops without adverse effects on yield. If applied at other than recommended crop stage, head and stem

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[illegible]

Restrictions

[illegible]

Environmental Precautions

[illegible]

Toxicity

[illegible]

Storage

[illegible]

Barricade/Barricade II

[illegible]

Formulation

[illegible]

Crops, Staging and Rates

[illegible]

[illegible] (cont'd)

Chassis and Hanging

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Rotate	Reserve our Guide	Reserve Re Sure — Cut
Quite Implement	Serve Lesson	Serve Increase 2 — Cards
Hang Cards	Low Hand or Cables 2 — Cards	Cell Lesson
Cards	Rotate Guide	
Expansion		

Registered Yard: Close

Column	Key	Additional Lesson Reference Tip
[illegible] cost	10 Access	Work Cards, Access Hardware Cards Can Sure Use Cost Cell [illegible] Hardware Sure Cut Cell Cables 2 — Cards Cutting Checking
[illegible] cost	10 Access	
Reading — service software	10 Access — Offline 2 Cost Hard — 2 Sure Offline	Work Cards Can Cards Cost to Re Reading Sale

1 Offline Layout to Moving Sure Set or 2 or Re Remote Set. Sale Cost according to Re Use Service or Cables to Offline Cards.

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Application Information

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Fitting Instructions

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Application Tips

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Keep It Works

Absorbed through voltage. Children cell designation 2 Lamp, and designation, Cell Lighting to clothing.

Expected Results

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Restrictions

Electrical: Accident control 1 Hour of application was, indoor, mouth, control. **Cleaning:** Mix, set to, you to, a, Work to, control, clothes 1 Work of application. **Professional Advice will:** Indoor, of, Work, Hardware, application, and Work to. **Maintaining:** Plastic, control, Mix, Hinge, grease, mouth, recommend, use, you, to, or, Hands, you to, mouth, 2 Cleaning, after, applications.

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Environmental Precautions

[illegible]

Cleaning

[illegible]

Storage

[illegible]

Sonogram/Sonogram Forte

[illegible]

Formulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Crops, Weeds and Rates

[illegible]

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Lontrel 360

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lontrel 360 (0109 0560)	Dow AgroSciences	Clopyralid 360 g/l	Solution	5 l/10 l

Crops, Staging and Rates

Crop	Staging	Rate per acre
Barley, oats, spring wheat	1 leaf - flag leaf emergence	80 - 227 ml
Canola (not glyphosate tolerant canola)	2 - 6 leaf	170 - 339 ml
Flax (including low linolenic acid varieties)	2 - 10 cm in height	
Seedling forage grasses	1 - 5 leaf	
Established forage grasses	Shot-blade stage, or in the fall after harvest or in early spring	
Fallow/chem-fallow and zero-crop farmland	Stage according to weeds	339 ml
Sugar beets	2 leaves to 6 leaf stage	226 - 339 ml
Perennials[1]	Stage according to weeds	339 ml
Pasture/hay (renovation)	Immediately after harvest or before seeding	339 ml

[1] Forage grasses: Kentucky bluegrass, smooth bromegrass, meadow brome, tall fescue, creeping red fescue, meadow fescue, tall fescue, meadow foxtail, orchard grass, alsike and red clovers, foxtail and timothy, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, crested wheatgrass.
[2] Dormant seeding of alfalfa, bird's-foot trefoil, cicer milkvetch, sainfoin, white prairie, sulfurweed, and wheatgrass.

Weeds and Staging

Canada thistle: Suppress or pre-bud stage. Others: young and actively growing.

Weeds controlled at 170 mL/acre

Alsike clover	Canada thistle[1]	wild

Weeds controlled at 227 mL/acre

Canada thistle	no-till stand [2]	volunteer alfalfa (5 - 10 cm)
common groundsel	perennial sow thistle[1]	wild buckwheat
common ragweed	scentless chamomile	
season-long control of Canada thistle @ 339 mL/acre	sheep sorrel [2]	

[1] Top growth [2] Suppression

Control of Canada thistle

For in-crop control of top growth of Canada thistle, apply Lontrel 360 at the rate of 170 mL/acre. This will suppress top growth of Canada thistle for 4 to 6 weeks. Some re-growth may occur by the end of the season but this will not interfere with the harvesting of the crop.

For season-long control of top growth of Canada thistle, apply Lontrel 360 at the rate of 227 mL/acre. This rate will generally provide season-long control of Canada thistle. Not all rhizomes will be killed and some re-growth may occur by the end of the growing season.

For season-long control of top growth, with a reduction of Canada thistle population in the following year, apply Lontrel 360 at the rate of 170 mL/acre. This rate will provide season-long control of Canada thistle and suppression into the following season, resulting in a reduction of the total number of Canada thistle shoots in the treated area.

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Registered Tank Mixes

Tank-mix partner	Lontrel 360 plus tank-mix partner rate	Additional weeds controlled
Canola		
Pinnacle Ultra + Merge Adjuvant	Lontrel 170 - 335 mL/acre + Pinnacle Ultra 0.170 - 0.45 L/acre + Merge 0.9 L/acre	Canada thistle, wild buckwheat, wild oats, green foxtail, volunteer barley, volunteer wheat, and volunteer oats.
Select + Assage adjuvant	Lontrel 170 - 335 mL/acre + Select 150 mL/acre + Assage 0.5%v/v	
CLEARFIELD canola		
Odyssey	Lontrel 170 - 335 mL/acre + Odyssey 17.3 grams	Grasses plus Lontrel susceptible weeds
Roundup Ready canola		
glyphosate	Lontrel 113 mL/acre + glyphosate 525 mL/acre (356 - 360 g/L formulation)	Canada thistle (season-long top growth), dandelions < 15 cm diameter (season-long top growth), dandelions > 15 cm diameter (suppression), perennial sow thistle (season-long top growth), wild buckwheat
Pea		
MCPA amine or ester	Lontrel 170 mL/acre + MCPA 500 ester up to 0.85 L/acre	Canada thistle (top growth) + MCPA susceptible weeds
	Lontrel 227 mL/acre + MCPA 500 ester up to 0.85 L/acre	Canada thistle (season-long) + MCPA susceptible weeds
	Lontrel 336 mL/acre + MCPA 500 ester up to 0.85 L/acre	Canada thistle (season-long with suppression into the following year), common groundsel, perennial sow thistle (top growth), scentless chamomile, wild buckwheat
Barley, oats and wheat		
2,4-D or MCPA amine or ester 500 formulation	Lontrel 113 mL + MCPA or 2,4-D 113 mL/acre	Canada thistle (top growth, 6 - 8 weeks) plus MCPA or 2,4-D susceptible weeds
	Lontrel 170 mL + MCPA or 2,4-D 113 mL/acre	Canada thistle (season-long) plus MCPA or 2,4-D susceptible weeds
Refine Extra + 2,4-D (500 g/L) or MCPA (500 g/L) amine or ester	Lontrel 85 mL/acre + 2,4-D or MCPA amine 335 mL/acre or 2,4-D 283 mL/acre + Refine Extra 8 grams. Add Agral 90 at 0.2% v/v to the tank mixture.	Canada thistle (season-long), cleavers (suppression), lady's thumb, perennial sow thistle, stinkweed, wild buckwheat, volunteer canola, wild mustard.

Note: Do not use 2,4-D or esters due to the probability of crop injury.

Acres treated per 6.67 L jug

- Applications of 85 mL/acre will treat 72.8 acres
- Applications of 113 mL/acre will treat 60 acres.
- Applications of 170 mL/acre will treat 36.2 acres
- Applications of 227 mL/acre will treat 19.70 acres.
- Applications of 336 mL/acre will treat 13.3 acres.

Application Information

Weeds Apply with ground equipment only. **Water Volume** 40 - 80 L/acre.

Application Tips

Do not use products containing 2,4-D or esters due to probability of crop injury. Rates of MCPA ester of 170 g active ingredient/acre or higher or MCPA amine of 200 g active ingredient/acre may cause some delay in maturity of flax, resulting in yield reduction. Make sure the sprayer tank has been thoroughly cleaned before Lontrel is mixed. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. Sow thistle plants emerging after spraying will not be controlled. Where contact

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Lontrel 360 (cont'd)

herbicides are used, such as bromoxynil, that damage the leaves of the Canada thistle, apply Lontrel 14 days prior or after an interval of 14 days, which allows Canada thistle to recover and resume growth.

Forage grasses: For control of the weeds listed on the label plus alsike clover, apply Lontrel at the rate of 170 - 336 mL/acre in 45 - 90 L/acre of water. Make one application per season by ground sprayer. For seedling grasses, apply at the 3 leaf stage and beyond. For established grasses, apply in the fall after harvest or early spring.

How it Works

Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young actively growing plants.

Expected Results

Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young actively growing plants. Death of weeds may not occur until 14 - 21 days after application. With the lowest rate of Lontrel on Canada thistle, some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop.

Restrictions

Rainfall: A rain-free period of 4 - 6 hours after application is required. **Grazing**: There are no restrictions on the grazing of crops or forages treated with Lontrel 360. If necessary, treated areas may be grazed immediately following application. **Pre-harvest Intervals**: Sugar beets - Do not apply within 90 days of harvest. Strawberry - P.H.I. = 200 days. **Re-cropping**: Fields treated with Lontrel can be seeded to barley, canola, forage grasses, flax, mustard, oats, rye, wheat or summerfallowed. Do not seed to crops other than those listed above for at least one year after treatment.

Use of straw and manure from treated crops: Lontrel residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as peas, beans, lentils, potatoes, sunflowers or other sensitive crops on land that has been mulched with straw containing Lontrel 360 residues within the last 12 months.

Environmental Precautions

Small amounts of drift may damage sensitive plants such as legumes.

Toxicity

Clopyralid is practically non-toxic to aquatic organisms, including fish on an acute basis. Clopyralid has a very low acute mammalian toxicity. Acute oral LC_{50} (rats) = > 2,000 mg/kg. It is practically non-toxic to bees.

Storage

Store in heated storage away from open flames or sparks. If frozen, warm slowly to room temperature and mix thoroughly before use.

Lorox/Linuron

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lorox L (PCP# 16279)	Tessenderlo Kerley Inc.	Linuron: 480 g/L	Liquid	10 L
Lorox DF (PCP# 28193)		Linuron: 50%	Dry flowable	5, 10, kg jug
Linuron 480 (PCP# 15544)	Loveland Products Canada	Linuron: 480 g/L	Liquid	10 L

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Crops, Staging and Rates

Crop	Staging	Rate per acre	
		Lorox L	Linuron
Post-emergent applications			
Barley, oats and spring wheat (including durum)* **	2 - 4 leaf	0.17 - 0.22 L	0.20 - 0.26 L
Field corn (directed spray)*	Apply when corn is at least 38 cm tall	1.16 - 2.18 L	0.97 - 1.82 L
Shelterbelts (established)**	In the spring before buds open and weeds are less than 10 cm tall	1.82 L	2.18 L
Pre-emergent applications			
Corn: less than 2.0% OM	Apply before corn emerges. Must be tank mixed with Atrazine.	0.91 L	1.09 L
Corn: 2 - 5 % OM		1.31 L	1.58 L
Potatoes: less than 2.0% OM	Apply just before crop emerges or when tops are completely covered by hilling.	0.91 L	1.1 - 1.72 L
Potatoes: 2 - 5 % OM		1.82 L	1.72 - 2.22 L
Banded Applications: Lorox L and Linuron can also applied in a narrow band directly over the row in a wide row crops Use cultivation for weed control in between the rows. For band application, use proportionately less product. For example, for 25 cm band on 75 cm row, use 1/3 of the broadcast rate.			

* Do not spray over top of corn. ** Established shelterbelts consisting of American elm, boxelder, caragana, Colorado spruce, green ash, poplar, scotch pine, Siberian elm, white spruce, willow. Apply only on stock planted for at least one year as a directed spray under the trees and bushes. *** Must be tank mixed with MCPA amine 500 when applying to wheat, oats and barley or MCPA K-salt when applying to wheat and barley.

Weeds and Staging

Apply when annual broadleaf weeds are in 2 - 4 leaf stage and when green foxtail is in 1 - 3 leaf stage.

When tank mixed with MCPA amine 500 in cereals, following weeds are controlled

Canada thistle	green foxtail*	ragweed	tartary buckwheat
chickweed	green smartweed	redroot pigweed	wild buckwheat
corn spurry	hemp-nettle	shepherd's-purse	
cow cockle	lady's-thumb	stinkweed	
flixweed	lamb's-quarters	stork's-bill	

* Suppression

Pre-emergent application and post emergent application in corn (directed applications and shelterbelts)

annual sow-thistle (seedlings)	goosefoot	prostrate pigweed	wild buckwheat
barnyard grass*	knotweed	purslane	wild radish**
common chickweed	kochia**	ragweed	wormseed mustard
common groundsel**	lamb's quarters	redroot pigweed	
corn spurry**	perennial sow-thistle**	shepherd's purse	
dandelion (seedlings)**	plantain (seedlings)**	smartweed	

* Suppression ** Not registered with Lorox L

Registered Tank Mixes

Tank mix partner	Linuron/Lorox + tank mix partner rate	Additional weeds controlled
Barley, oats and spring wheat, including durum (post-emergence)		
MCPA amine 500	Lorox: 0.17 - 0.22 L or Linuron: 0.20 - 0.26 L + MCPA ester 0.34 - 0.45 L/acre	See above table on weeds controlled by Lorox/Linuron + MCPA tank mixes.
MCPA K-salt 400	Lorox: 0.17 - 0.22 L or Linuron: 0.20 - 0.26 L + MCPA K-saltr: 0.4 - 0.57 L/acre	
Corn (pre-emergence)		
Atrazine	Less than 2.0 % OM: Linuron: 1.1 + Atrazine: 0.15 - 2. 5 L/acre 2 - 5 % OM: Linuron: 1.58 + Atrazine: 0.15 - 2. 5 L/acre	

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Lorox/Linuron (cont'd)

Application Information
With: Ground equipment. **Water Volume**: Cereals: 40 L/acre minimum. **Potatoes**: 120 L/acre. 90 - 135 L/acre **Corn**: pre-emergent: 90 - 135 L/acre; post-emergent 70 - 140 L/acre.

Application Tips
Do not use on sandy or coarse-textured soils, low in organic matter, as crop injury may result. Do not use when crops are under drought stress. Fruit trees: avoid contact with fruit, foliage and green bark with spray or drift as injury may result.

How it Works
A systemic herbicide absorbed by leaves and roots. Yellowing (chlorosis), stunting and finally death occurs 10 - 14 days after treatment.

Expected Results
Weeds: Yellowing starts 7 - 10 days after application. Effect greatest under excellent growing conditions. Weed control will vary depending on species, time of application and growing conditions. **Crop**: A slight yellowing of crop, leaf tip and leaf margin burn may be seen 7 - 10 days after application. Crop recovers within 14 - 18 days. Crop injury can occur if applied during period of high heat.

Restrictions
Rainfall: Heavy rainfall within 2 hours may decrease activity. Pre-emergent treatment requires rainfall or irrigation for activation. Carrots, corn or potatoes may be severely injured if unusually heavy rains follow application. **Grazing**: Do not graze or cut for hay; there are not sufficient data available to support such use. **Re-cropping**: Do not apply post-emergent corn treatment within 60 days of harvest. 25% carryover into next growing season if rates are 1.8 L/acre or higher

Environmental Precautions
Linuron is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present.

Toxicity
Low acute toxicity. Acute oral LD_{50} (rats) = 3,600 mg/kg. Very toxic to fish. Non-toxic to bees.

Storage
Lorox L/Linuron: Store in a heated area. Do not freeze as settling may occur. If frozen, thoroughly mix to resuspend.

MCPA

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
MCPA 500 amine (PCP# 20308)	IPCO	500 g/L	Solution	2 x 10 L jugs
MCPA 600 amine (PCP# 31327)	IPCO	600 g/L	Solution	2 X 10 L jugs
MCPA 500 amine (PCP# 9516)	Loveland Products Canada	500 g/L	Solution	2 x 10 L jugs
MPower MCPA 500 amine (PCP# 30461)	NewAgco Inc	500 g/L	Solution	2 x 10 L jugs
MCPA 600 amine (PCP# 28384)	Nufarm	600 g/L	Solution	2 x 10 L jugs
MPower MCPA 500 amine (PCP# 29244)	Loveland Products	500 g/L	Solution	2 x 10 L jugs
MCPA Amine 600 (PCP# 31327)	Loveland Products Canada	600 g/L	Solution	10 L
MCPA 500 ester (PCP# 30462)	NewAgco Inc.	500 g/L	Solution	2 x 10 L jugs

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Product	Company	Active ingredient	Formulation	Container size
MCPA 600 ester (PCP# 27802)	IPCO	600 g/L	EC	2 x 10 L jugs
MCPA 600 ester (PCP# 27803)	Nufarm	600 g/L	EC	2 x 10 L jugs, 115 L, 500 L
MCPA 600 ester (PCP# 27804)	Loveland Products Canada	600 g/L	EC	2 x 10 L jugs
MCPA 600 ester (PCP# 29001)	Loveland Products	600 g/L	EC	2 x 10 L jugs, 115 L
MCPA 300 Sodium salt (PCP# 20306)	IPCO	300 g/L	Solution	2 x 10 L jugs
MCPA 300 Sodium salt (PCP# 14718)	Nufarm	300 g/L	Solution	2 x 10 L jugs
MCPA 300 Sodium salt (PCP# 9858)	Loveland Products Canada	300 g/L	Solution	2 x 10 L jugs

Crops, Staging and Rates

Crop	Stage	Rate	
Wheat (spring and durum), barley, spring rye	From the 3-leaf expanded to the early flag-leaf (shot blade) stage	500 amine: 0.45 L/acre 600 amine or ester: 0.42 L/acre	400 K salt: 0.53 L/acre 300 Na salt: 0.81 L/acre
Oats	From the 3 leaf to early flag leaf	500 amine or ester: 0.45 L/acre 600 amine or ester: 0.36 L/acre	400 K salt: 0.53 L/acre 300 Na salt: 0.81 L/acre
Winter wheat (WW) and fall rye (FR)	Spring: from the time growth commences until flag leaf stage	500 amine: 0.45 L/acre 600 ester: 0.42 L/acre	400 K salt: WW 0.61 L/acre, FR: 0.40 L/acre 300 Na salt: 0.81 L/acre
Flax (excluding solin)	5 cm in height to pre-bud stage. Apply at 5 - 10 cm in height for maximum crop tolerance	500 amine: 0.4 L/acre 600 amine: 0.34 L/acre; 600 ester: 0.28 L/acre	400 K salt: 0.65 L/acre 300 Na salt: 0.71 L/acre
Corn	As a broadcast spray up to 15 - 18 cm tall or 6-leaf stage. Directed spray using drop nozzles: up to 3 wks. before tasseling	500 amine or ester: 0.45 L/acre 600 amine only: 0.37 L/acre	400 K salt: 0.51 L/acre 300 Na salt: 0.61 L/acre
Peas (field and canning)	Vine 10 - 18 cm long. For short stature determinate varieties apply at the early stage within this range	500 amine: 0.135 - 0.22 L/acre 600 amine only: 0.17 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Forages (established)	Apply in the spring up to the shot blade stage	500 amine only: 0.45 L/acre	
Seedling forage (not for grass production)	From the 3 leaf to early flag leaf	500 amine only: 0.45 L/acre	
Pasture, rangeland, turf	Spring or fall	500 amine or ester: 1.41 L/acre	600 amine: 1.41 L/acre; 600 ester: 1.13 L/acre
Red clover (seedling and established)	Seedling: 1 - 3 trifoliate stage Established: breaking of dormancy in the spring up to 7. 5 cm	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Cereals underseeded to alfalfa (not Flemish)	Apply when alfalfa is in the 1 - 3 trifoliate stage	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.4. L/acre
Cereals underseeded to alsike, ladino and red clover	Apply when clover is in the 1 - 3 trifoliate stage	500 amine: 0.28 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4. L/acre
Fairways and lawns	Apply early in the summer	500 amine: 0.4 - 1.0 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4. L/acre

Weeds, Rates and Staging

Apply when weeds are in 2 - 4 leaf stage. Use lower rate when weeds are small and growing conditions are good; use higher rate when weeds are in dry or cool conditions or under heavy infestation.

Weed listing and rate range for individual formulations may differ slightly; please consult the product label for specific weed controlled and rates for each formulation.

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MCPA (cont'd)

Susceptible weeds	Harder to control weeds		Top growth control only
MCPA Amine 500: 0.28 - 0.45 L/acre MCPA Ester and amine 600: 0.24 - 0.36 L/acre MCPA 400 K: 0.61 - 0.67 L/acre MCPA 300 Na: 0.5 - 0.81 L/acre	MCPA amine 500: 0.45 - 0.71 L/acre MCPA amine and ester 600: 0.42 - 0.61 L/acre MCPA 400 K: 0.71 - 0.81 L/acre MCPA 300 Na: 0.81 - 1.1 L/acre		MCPA amine 500: 0.45 - 0.71 L/acre MCPA amine and ester 600: 0.42 - 0.61 L/acre MCPA 400 K: 0.71 - 0.81 L/acre MCPA 300 Na: 0.81 - 1.1 L/acre
bluebur burdock (before 4 leaf stage) cocklebur common plantain flixweed (seedlings) Indian mustard lamb's-quarters prickly lettuce ragweed Russian pigweed shepherd's-purse stinkweed vetch wild radish wild mustard wormseed mustard wild sunflower	**Weeds listed under susceptible plus**		blue lettuce Canada thistle corn spurry chicory dog mustard field bindweed field horsetail gumweed hedge bindweed hoary cress lady's-thumb leafy spurge perennial sow-thistle Russian knapweed Russian thistle smartweed tartary buckwheat teasel wild buckwheat wormwood
	annual sow-thistle biennial wormwood common chickweed curled dock (before the 4-leaf stage) daisy fleabane dandelion goat's-beard hairy galinsoga hawkweed heal-all hempnettle (before the 4-leaf stage) knotweed (before the 4-leaf stage)	mouse-eared chickweed oak-leaved goosefoot peppergrass pineapple weed, plantain purslane redroot pigweed sheep sorrel smartweed stinging nettle tansy mustard velvetleaf wild radish, yellow rocket (before the 4-leaf stage)	

Registered Tank Mixes

Barley

MCPA 500 amine (400 mL/acre) + Sencor (111 - 202 mL/acre)

MCPA 500 amine (344 mL/acre) + Banvel (93 mL/acre)

MCPA K-salt (404 mL/acre) + Banvel II (92 mL/acre)

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre)

Wheat

MCPA 500 amine (400 mL/acre) + Sencor (111 - 172 mL/acre)

MCPA 500 amine (344 mL/acre) + Banvel (93 mL/acre)

MCPA K-salt (404 mL/acre) + 117 mL/acre)

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre). Note: Do not exceed 270 mL/acre rate of MCPA K-salt in winter wheat using this tank mixture.

Oats

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre)

Cereals underseeded to alfalfa and bird's-foot trefoil

MCPA 500 amine (28 mL/acre) + Embutox (505 mL/acre)

Application Information

How to Apply: Ground and air. **Water Volume:** Cereals, flax, pastures, forage grasses: 40 L/acre; Peas: minimum of 61 L/acre; Pasture, rangeland and turf: 180 L/acre; Cereals underseeded to legumes: 61 - 81 L/acre.

Application Tips

Best weed control occurs when daytime temperatures are above 21°C and nighttime temperatures are at 10°C. Do not spray when air temperature is above 27°C. Extremely hard water may reduce performance. When applying to flax under hot and humid conditions, some crop injury and delay in maturity may result. Spraying in the evening and/or increased volumes of water (40 or more litres per acre) may reduce the risk of flax injury.

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How it Works
A systemic, absorbed by leaf and stem surfaces and translocated to the actively growing regions. MCPA disrupts cell division, causing abnormal growth response, thereby affecting respiration and food reserves.

Expected Results
Weeds start to twist between 2 - 20 days after spraying, depending on weather conditions, formulation and species of weeds. Following the twisting and bending, plants will turn brown, and then die. Only emerged weeds will be controlled.

Restrictions
Effect of Rainfall: Rain within 6 hrs of MCPA Na salt, or MCPA K-salt, 4 hrs of MCPA amine, and 2 hrs of MCPA ester application will decrease weed control. **Grazing:** Do not graze or cut for green feed until 7 days after spraying. **Re-cropping:** No restrictions the year after application.

Environmental Precautions
MCPA is toxic to aquatic organisms and non-target terrestrial plants and can readily leach in the soil.

Toxicity
Moderate acute mammalian toxicity.

Storage
If frozen, warm to 5°C and mix well before using.

Mecoprop

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Mecoprop - P (PCP# 27091)	Loveland Products Canada	Mecoprop: 150 g/L	Liquid	10 L

Crops, Staging and Rates
Rate: small weeds (seedlings) - 2.2 L/acre. Mature weeds: 3.4 L/acre.

Crop	Staging	Remarks
Barley, oats and wheat	3-leaf expanded stage until the early flag leaf (shot-blade)	Apply under good growing conditions. Do not spray on grain underseeded with legumes.

Weeds and Staging
In barley, oats and wheat
Apply to weeds from 2 - 4 leaf stage:

black medick
Canada thistle (top growth only)
chickweed
cleavers
corn spurry
lamb's quarters
plantain
plantain
volunteer clover
wild mustard

Application Information
With: Ground equipment only. Do not apply by air.
Water Volume: Cereals: 80 - 120 L/acre.

Application Tips
Recommended water volume is essential for optimum weed control. Cold weather and drought may cause a delay in weed control action.

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How It Works
A systemic that disrupts the plant's translocation system causing the accumulation of plant food in the shoots and subsequent starvation of the roots.

Expected Results
Weeds: Leaf curling and stem twisting should be visible within 4 - 7 days after spraying. Weeds should be dead within 1 - 4 weeks of application. **Crop:** Deformed heads, stunting, flowers and twisted stems could result if recommendations are not followed or if crop is under stress conditions.

Restrictions
Rainfall: Rain within 4 - 6 hours will reduce effectiveness. **Grazing:** Do not graze or feed treated crops to livestock. **Re-cropping:** No restrictions.

Environmental Precautions
Leaching: Readily leached from soil. In dry soils, it has a longer residual.

Toxicity
Moderate oral toxicity. Acute oral LD_{50} (rats): 650 mg/kg.

Storage
Store above 0°C. If stored for 1 year or longer, shake well before using.

Momentum

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Momentum (PCP# 30455)	Loveland Products	Clopyralid: 60 g/L + Fluroxypyr: 90 g/L	Emulsifiable concentrate	5 litre jug

Each jug of Momentum covers 20 acres.

Crops, Staging and Rates

Crop	Staging	Rate
Spring wheat, durum wheat and spring barley	Apply to the crop from 3 leaf to just before the flag leaf	450 mL/acre

Weeds and Staging
Momentum by itself controls a limited number of broadleaf weeds.

Weeds controlled		Weeds suppressed
Canada thistle* cleavers (1 - 4 whorl) hoshe (2 - 8 leaf)	volunteer flax (1 - 12 cm) wild buckwheat (1 - 4 leaf)	stork's bill (1 - 8 leaf)

*Season long control with some regrowth in the fall. Apply from 10 cm to pre-bud stage.

Momentum should **ALWAYS** be applied with a broadleaf tank mix partner. There are two rates of MCPA Ester registered for use. Refer to the MCPA label for weed staging.

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Low rate of [redacted] (SE 0°): [redacted]
Weeds listed for Mixtures (FLO):

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

High rate of [redacted] (SE 0°): [redacted]
Weeds listed above (FLO):

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

Registered Tank Mixes

Tank mix partner	Crops	Tank mix partner rate per acre	Weeds controlled
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

Application Information

Grids [redacted] **Water Volumes** [redacted]

[redacted]

Mixing Instructions

[illegible]	Step 2	Step 3	Step 4	Step 5
[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	

[illegible]	[illegible]					
	Step 1	Step 2	Step 3	Step 4	Step 5	
[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Application Type

[illegible]

Area of Weeds

[illegible]

MPower Good Harvest

[illegible]

[illegible]

[illegible]

Application Information

[illegible]

Application Use

[illegible]

Keep it Gentle

[illegible]

Expected Results

[illegible]

Restrictions

[illegible]

Environmental Precautions

[illegible]

Storage

[illegible]

[illegible]

Formulation

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Crops, Pests and Notes

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] Views and Imaging

[redacted]

[redacted] [redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted] [redacted]

[redacted]

[redacted] and [redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted] Information

[redacted]

[redacted] Use

[redacted]

[redacted] Effects

[redacted]

[redacted] Results

[redacted]

[redacted]

[redacted]

Rhustan Trans-Rx-Cin (cont'd)

6 months	Spring wheat, durum wheat, barley, oats, flax
22 months	Canola, lentils, peas, fababeans, tame mustard, alfalfa, canary grass, dry beans, fescue, red clover
22 other crops, field bioassay at 22 months	

Whatever Rhustan is used on land previously treated with dry herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.

Environmental Precautions

Rhustan Trans-Rx-Cin is toxic to aquatic organisms and non-target terrestrial plants. Rhustan is water soluble and mobile in the soil.

Toxicity

Low acute toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in a cool, dry place.

Navius VM

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Navius VM (DVM 01862)	Bayer CropScience	Metsulfuron-methyl: 12.0% Bromoxynil heptanoate: 39.0%	Wettable granule	1.25 kg

Crops, Staging and Rates

Industrial Non-crop Areas – rights of way, roadsides, industrial sites, fence lines and other non-crop areas
Rate: 417.0 – 834.0 g/acre

Weeds Controlled at 417.0 g/acre, 10L/ac with non-ionic adjuvant at 0.25% v/v or 10L/ac adjuvant or Crop Oil Concentrate at 0.5% v/v.

Weeds controlled		Weeds suppressed
annual sowthistle	orange hawkweed	lamb's quarters
ball mustard	ox-eye daisy	ragweed
bladder	perennial sowthistle	wild buckwheat
Canada goldenrod*	prickly lettuce	
Canada thistle	redroot pigweed	
chickweed	Russian thistle	
common groundsel	scentless chamomile	
common hemp	shepherd's purse	
common persicaria	spotted knapweed	
corn spurry	stinkweed	
cow cockle	stork's bill	
dandelion	sunrise (smooth, shepherd)	
diffuse knapweed	sweet clover (white, yellow)	
flixweed	tansy buckwheat	
goat's-beard*	volunteer canola (except Clearfield varieties)	
goat's-pepper* (up to 4 leaf)	western snowberry	
green smartweed	white cockle	
hemp nettle	wild carrot	
kochia (including dry-resistant)	wild mustard	
lady's thumb	wild rose	
lady's-sorrel	yellow rocket	
Limadon cinquefoil*		

*season long control

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Brush Species Controlled at 135.2 gm/ac. Mix with non-ionic adjuvant at 0.25% v/v or Merge adjuvant or Crop Oil Concentrate at 1.0% v/v.

Tree species	Maximum height
Black locust	< 1 metre
Balsam fir, Douglas fir, black spruce, Norway spruce, white spruce	< 2 metres
Manitoba maple (box elder), red maple, sugar maple, common snowdrop, green ash, white ash, plains cottonwood, balsam poplar, black poplar, sandbar/shoreline willow, yellow poplar, large pussy willow, tree of heaven, hackberry	< 2.5 metres
Black cherry, chokecherry, pin cherry, trembling aspen	< 3 metres

Brush Species Controlled at 202 gm/ac. Mix with non-ionic adjuvant at 0.25% v/v or Merge adjuvant or Crop Oil Concentrate at 1.0% v/v.

Tree species	Maximum height
Bitternut hickory, pignut hickory	2 metres
Black oak, northern red oak	2.5 metres

Brush Species Controlled at 270.4 gm/ac. Mix with non-ionic adjuvant at 0.25% v/v or Merge adjuvant or Crop Oil Concentrate at 1.0% v/v.

Tree species	Maximum height
Eastern white pine, jack pine, red pine, Western white pine	< 2 metres
Balsam fir, Douglas fir, black spruce, Norway spruce, white spruce	2 - 3 metres

Application Information

Ground: low volume foliar broadcast - 202 litres spray volume per acre. Direct the spray solution to thoroughly wet the foliage of the target plants, but not to the point of runoff.

Ground: high volume foliar broadcast - use Navius VM at 135.2 to 270.4 gm/ac in enough water to make 1000 litres of spray solution; use up to 800 litres per acre.

Aerial application: fixed wing aircraft or helicopter: 12 - 20 litres spray volume per acre.

Application Tips

For best results, applications of Navius should be made when brush species and weeds are actively growing. Complete coverage of all foliage and stems is required for brush control. Applications should be made after the target species have leafed out, but before full colouration has begun. Do not treat brush species that exceed 2.5 m in height unless otherwise indicated) or control may be decreased. Where dense stands exist or where growth of the target species is advanced, use of the high volume foliar application method is recommended. Apply to brush species as a full coverage spray to foliage and stems using equipment that will ensure uniform coverage.

How It Works

The most noticeable symptom is a bending and twisting of stems and leaves. Other advanced symptoms include severe chlorosis, necrosis, stem thickening, growth stunting, leaf crinkling, calloused stems and leaf veins, leaf-cupping and enlarged roots.

Restrictions

Do not graze or feed forage, hay or straw from treated areas to livestock. Do not use plant material as mulch or compost, and do not apply directly on or around desirable plants. Do not use on lawns or turf. If non-crop sites treated with DuPont Navius VM herbicide are to be converted to a food, feed or fibre agricultural crop or to a horticultural crop, a field bioassay should be completed before planting the desired crop. There is a possibility of off-site movement if applied to dry, light soils. Caution is advised when using this product in areas where loss of desirable conifer or deciduous trees and/or shrubs as well as other broadleaf plants, including but not limited to, legumes and wild flowers, cannot be tolerated. Low rates of DuPont Navius VM herbicide can kill or severely injure most crops.

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Navius VM (cont'd)

Environmental Precautions
Observe buffer zones specified under **DIRECTIONS FOR USE** on the Navius VM label.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg. TOXIC to aquatic organisms and non-target terrestrial plants including coniferous and deciduous trees.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed.

Nortron/Etho SC

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Nortron (PCP# 17253)	Bayer CropScience	Ethofumesate: 480 g/L	Suspension concentrate	10 L jug
Etho SC (PCP# 28360	United Phosphorus Inc.			

Crops, Staging and Rates
Fall: Apply before ground freezes. Apply in a band on the soil surface.

Spring: Apply before seeding and shallowly (2.5 - 5.0 cm) incorporate or pre-emergence.

Crop	Soil type	Method of application	
		Broadcast	18 cm band/ 55 cm row
Sugar beet	Light soils	1.38 - 1.83 L/acre	0.40 - 0.64 L/acre
	Medium soils (< 3 % OM)	1.83 - 2.73 L/acre	0.64 - 0.91 L/acre
	Heavy soils (> 3% OM)	2.73 - 3.32 L/acre	0.91 - 1.13 L/acre

Weeds and Staging

Pre-emergence

- barnyard grass
- foxtail
- kochia
- lady's-thumb
- lamb's-quarters
- purslane
- redroot pigweed
- Russian thistle (suppression)
- shepherd's-purse
- volunteer barley
- volunteer oats
- volunteer wheat
- wild buckwheat (suppression)
- wild oats

Registered Tank Mixes
Tank mixes only on medium textured soils with an organic matter content < 3%. Do not use this mix on high organic soils or soils with sandy, loam sand or sandy loam soils.

Tank mix partner	Tank mix rate	Additional weeds controlled
Broadcast application		
Pyramin	Nortron/Etho: 1.47 L/acre + Pyramin: 2.12 L/acre	Pyramin susceptible weeds
18 cm band/55 cm row		
Pyramin	Nortron/Etho: 0.49 L/acre + Pyramin: 0.7 L/acre	Pyramin susceptible weeds

Application Information
With: May be applied with ground equipment. Do not apply by air. **Water Volume**: 44 - 222 litres per acre.

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Application Tips

Apply Nortron before or at planting time and incorporate into the soil to a depth of 2.5 - 5.0 cm. Deeper incorporation may reduce effectiveness. Nortron may be applied pre-emergence at the time of planting or shortly after, but prior to weed emergence.

Incorporation equipment: Hooded-power or ground-driven rotary tillers, rolling cultivators and harrows are most effective for incorporating Nortron into the soil. Do not apply Nortron through soil injector shanks. All existing vegetative growth should be thoroughly worked into the soil before treatment. Do not allow spray mixture to stand in tank overnight.

How it Works

Uptake of ethofumesate occurs primarily via the emerging shoot as it passes upwards through treated soil; however, for certain broadleaf species, root uptake is more important. Ethofumesate is non-volatile, and in all cases, uptake occurs from aqueous solution.

Expected Results

Ethofumesate applied pre-plant incorporated with proper activation will normally not permit weed emergence. If emergence should occur, uptake has occurred; seedling will show loss of vigour and eventual death.

Restrictions

Rainfall: Normally 1.5 cm of rainfall is sufficient to activate Nortron. In areas where moisture can be marginal, incorporation is recommended. **Grazing**: Do not graze the treated crops or cut for hay; there are not sufficient data available to support such use. **Re-cropping**: Do not rotate with any crops other than sugar beets for 12 months after application. Thorough tillage should precede the planting of crops other than sugar beets. If crop is lost due to climatic or soil conditions following application of Nortron, do not plant crops other than sugar beets in Nortron-treated land during the same season.

Do not retreat field with Nortron. Wheat and barley may be injured if planted following a dry sugar beet year.

Environmental Precautions

Nortron/Etho SC is toxic to aquatic organisms and non-target plants. Observe buffer zones of 1 metre for sensitive habitats.

Toxicity

Moderate to low acute toxicity. Acute oral LD_{50} (rats) > 2,100 mg/kg. Causes eye or skin irritation.

Storage

Do not use or store near heat or open flames. Store Nortron in a cool place, above 0°C.

Nuance/MPower X/Inferno WDG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Nuance (PCP# 29468)	FMC of Canada	Tribenuron-methyl: 75%	Water dispersible granule	320 g
MPower X (PCP# 30964)	NewAgco Inc.			
Inferno WDG (PCP# 30838)	Arysta LifeScience			

Nuance/MPower X/Inferno WDG are purchased alone but must be used in a mix with either 2,4-D ester or glyphosate.

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Nuance/MPower X/Inferno WDG (cont'd)

Crops, Staging and Rates

Crop	Stage	Rate**
Barley* Wheat (including durum)*	Full 3-leaf stage to just before the flag leaf (shot blade)	Nuance: 4 grams/acre + 2,4-D ester LV 700: 250 mL/acre. Note: Do not add a surfactant.
Summerfallow	Winter annuals: fall rosettes and spring seedlings. Summer annuals: emergence, up to the early flowering	

* Do not apply to barley and wheat underseeded to legumes or grasses. ** Do not apply Nuance , Inferno or MPower X alone. Always add 2,4-D LV ester or glyphosate.

Weeds and Staging

Apply to young, emerged actively growing weeds that are less than 10 cm tall or across and before the crop canopy closes.

Nuance/MPower X/Inferno WDG + 2,4-D LV ester 700

- annual sunflower
- ball mustard
- Canada thistle (top growth)
- cow cockle
- flixweed*
- hare's-ear mustard
- indian mustard
- kochia
- lamb's-quarters
- narrow-leaved hawk's-beard*
- prickly lettuce
- redroot pigweed
- Russian pigweed
- Russian thistle
- shepherd's-purse*
- stinkweed*
- sweet clover
- thyme-leaved spurge
- tumble mustard
- wild buckwheat** (1 - 3 leaf)
- wild mustard
- wild radish
- wormseed mustard

* Fall rosettes and spring seedlings ** Suppression

Registered Tank Mixes

Tank mix partner	Nuance/MPower X/Inferno WDG + tank mix partner rate	Additional weeds controlled
Barley and wheat (including durum)		
Assert*	Nuance/MPower X/Inferno WDG : 4 g/acre + 2,4-D ester LV 700: 250 mL/acre + Assert: 525 - 648 mL/acre	All weeds controlled by Nuance and 2,4-D plus wild oats
Puma[120] Super**, Cougar 120 EC	Nuance/MPower X/Inferno WDG : 4 g/acre + 2,4-D LV 700 ester: 250 mL/acre + Puma[120]Super/Cougar 120 EC: 156 mL/acre	All weeds controlled with Nuance and 2,4-D plus green foxtail (1 - 6 leaf stage)
Spring wheat and barley (excluding durum)		
Banvel II***	Nuance/MPower X/Inferno WDG : 4 g/acre + 2,4-D ester LV 700: 250 mL/acre + Banvel II: 45 mL/acre	All weeds controlled by Nuance and 2,4-D plus Group 2 resistant kochia
Summerfallow and pre-seed		
Glyfos Cheminova glyphosate Roundup Transorb Roundup Weathermax Touchdown iQ	Nuance/MPower X/Inferno WDG : 4 g/acre + 0 .3 - 0.5 L/acre of Glyfos, Cheminova glyphosate, Roundup Transorb, and Touchdown iQ. Use .336L/acre of Roundup Weathermax	See glyphosate listing for additional weeds controlled

* Use the low rate of Assert when the majority of wild oats are in the 1 - 3 leaf stage and the higher rate if wild oats are in the 4-leaf stage. Apply when the crop is in the full 3-leaf stage. **Apply from the full 3-leaf stage to the 6-leaf + 3 tiller stage of wheat (including durum) and the full 3-leaf stage to the 5-leaf + 2 tiller stage of barley. For green foxtail control, apply at the 1-6 leaf (up to emergence of the 3rd tiller) stage. ***Apply the tank mix from the full 3-leaf stage to the 6-leaf + 3 tiller stage of wheat (excluding durum) and barley and to kochia plants that are 2.5 - 10 cm in height.

Application Information

With: Apply with ground equipment. Do not apply by air. **Water Volume**: 40 L/acre.

Application Tips

Wild oat herbicides require a 4 - 5 day interval before or after an application of Nuance/MPower X/Inferno WDG. Effectiveness may be reduced if spray mixture remains in tank for more than 24 hours. When tank mixed with Assert, apply within 12 hours of mixing.

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How it Works
Absorbed by foliage and roots, inhibits cell elongation.

Expected Results
Nuance/MPower X/Inferno WDG stops growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Favorable growing conditions following treatment promote the activity of Nuance/MPower X/Inferno WDG while cold, dry conditions delay the activity.

Restrictions
Rainfall: Nuance/MPower X/Inferno WDG requires 4 - 6 hours of dry weather to be absorbed by weed foliage. **Grazing**: Do not graze or feed to livestock within 30 days of application. **Re-cropping**: A minimum of 2 months should be left between the application of this product and harvest or seeding of the next crop. The following crops can be seeded two months after application: canola, flax, lentils, and alfalfa.

Environmental Precautions
The active ingredient, tribenuron-methyl, is considered to be toxic to many plants and non-toxic to fish, aquatic invertebrates, soil micro- and macro-organisms, birds, mammals and insects.

Toxicity
Low to moderate oral toxicity. Acute oral LD_{50} (rats) = > 2,000 mg/kg. Low to moderate dermal toxicity. May irritate eyes, nose, throat and skin.

Storage
Store in a cool, dry place.

OcTTain XL

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size	Acres to treat per package
OcTTain XL (PCP# 30077)	Dow AgroSciences	Fluroxypyr: 90 g/L + 2,4-D ester: 360 g	EC	2 x 9 L 108 L 576 L bulk	40 acres (case) 240 acres 1,280 acres

1 case will treat 40 acres, 108 L bulk treats 240 acres, and 576 L will treat (1280 acres)

Crops, Staging and Rates
Cereals: 4 - flag leaf stage
Seedling and established grasses (seed production only): 2 - 4 leaf stage. Rate: 450 mL/acre.

barley	meadow bromegrass*	crested wheatgrass*	smooth bromegrass*
creeping red fescue*	spring wheat	intermediate wheatgrass*	tall fescue*
durum wheat	timothy*		winter wheat**

* Registered under the User Requested Minor Use Registration. Dow AgroScience assumes no responsibility with respect to performance and/or crop tolerance. ** Apply to winter wheat in the spring from the 3 tiller stage, to just before the flag leaf stage.

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OcTTain XL (cont'd)

Weeds Controlled or Suppressed**

Weed stage: 2 - 4 leaf stage, unless otherwise noted

bluebur
burdock
canola (volunteer)
chickweed* (suppressed up to 8 cm)**
cleavers (1 - 8 whorls)
clovers (sweet)
cocklebur
flixweed
field horsetail*
goat's-beard
hemp-nettle* (2 - 6 leaf stage)
hoary cress**
kochia*
lamb's-quarters
mustards (except green tansy, dog and grey tansy)
perennial sow thistle (suppressed)
plantain
prickly lettuce
ragweed
redroot pigweed (suppressed)
round-leaved mallow (1 - 6 leaf)
shepherd's-purse
stork's-bill (1 - 8 leaf)
stinkweed
sunflower (annual)
vetch
wild buckwheat (1 - 8 leaf)
wild radish
volunteer flax (1 - 12 cm)

* Including biotypes resistant to Group 2 herbicides that inhibit ALS/AHAS enzymes

** Top growth control only.

Weeds controlled with the addition of 80 mL/acre of 2,4-D ester herbicide (equivalent to 0.2 L/ha of 2,4D LV 700)

annual sow-thistle (suppression)
blue lettuce (top growth)
Canada thistle (top growth)
common chickweed* (up to 8 cm)
dandelion (spring rosettes)
dog mustard
docks
field bindweed (top growth)
field peppergrass
gumweed
hairy galinsoga
hedge bindweed
lady's-thumb
leafy spurge (top growth)
oak-leaved goosefoot
perennial sow-thistle (top growth) (suppression)
redroot pigweed
Russian thistle
smartweed
tansy

* Including biotypes resistant to Group 2 herbicides that inhibit ALS/AHAS enzymes

Registered Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
Achieve Liquid*	Barley, spring wheat, durum wheat	0.2 L/acre	Turbocharge: 0.5% v/v or Intake: 0.66% v/v
Everest	Spring wheat, durum wheat	17. 4 g/acre	Agral 90 or Ag Surf: 0.25% v/v
Horizon, Signal, Foothills**	Spring wheat, durum wheat	93 mL/acre	Score: 0.8% v/v
Assert SC	Barley, spring wheat, durum wheat	0.53 - 0.65 L/acre	Acidulate
Pume[120] Super	Spring and durum wheat	0.16 - 0.31 L/acre	None required
Simplicity	Spring and durum wheat	0.2 L/acre	None required
Simplicity ***	Spring and durum wheat	0.15 L/acre	None required

* Do not apply this tank mix prior to the 4-leaf stage of the cereal crop as temporary crop injury could occur, particularly in spray overlaps.

** Wild oat control may be reduced when tank mixed with OcTTain XL

*** The low rate of Simplicity + OcTTain XL is a registered use when wild oat populations are less than 75 wild oats/square metre.

Application Information

How to Apply: Ground application 20 - 40 L/acre. **Air**: water volume 12 - 20 L/acre.

Application Tips

OcTTain XL activity is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 8°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. drought, heat or cold stress, or if weeds have initiated flowering, or if heavy infestations exist. Application before the 4-leaf stage of wheat and barley may cause severe twisting of leaves and leaf, stem and head deformities, which may reduce, yield up to 10%. Do not apply later than the flag-leaf stage. Some twisting may be evident on barley. This twisting is transitory and may disappear within 3 weeks.

How it Works

OcTTain XL herbicide tank mix is non-residual. The components of OcTTain XL tank mix move within the plant to

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control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Broadleaf weeds: Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Do not apply if rain is expected in 1 hour. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut for hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days prior to slaughter. **Pre-harvest Intervals:** Do not harvest the treated mature crop within 60 days after application. **Re-cropping:** Fields treated with OnTTain XL herbicide tank mix can be seeded the following year to alfalfa, barley, corn, dry beans, canola, flax, forage grasses, lentils, mustard, oats, peas, potatoes, rye, soybeans, sugar beets, sunflowers, wheat or summerfallowed. Do not seed crops other than those listed above for at least one year following treatment.

Environmental Precautions

A 15 metre buffer zone should be established between areas to be sprayed and aquatic environments or sensitive habitats. **Runoff:** Under certain conditions, OnTTain XL has the potential to run off from treated areas. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil and poorly draining soil (e.g. soils that are compacted, fine textured, or low in organic matter such as clay). Avoid application of this product when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip (buffer zone) between the treated area and the edge of the water body.

Toxicity

2,4-D has moderate acute mammalian toxicity. Acute oral LD_{50} = technical 639 - 764 mg/kg. Fluroxypyr has very low mammalian toxicology. Acute oral LD_{50} > 2,000 mg/kg.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

Odyssey

[redacted] Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Odyssey (PCP# 25111)	BASF Canada	Imazamox: 35% + imazethapyr: 35%	Water dispersible granules	8 x 86.5 g

One case of 8 x 86.5 gram pack treats 40 acres. One 86.5 g soluble bag treats 5 acres.
Note: Odyssey must be applied with Merge 0.5% v/v. **Note:** The surfactant is not included in the package.

Crops, Staging and Rates

Crop	Stage	Rate
CLEARFIELD canola	2 - 6 leaf stage	Odyssey 17.2 grams/acre + Merge 0.5% v/v (5.0 L/1,000 L spray solution)
CLEARFIELD ACCESS (Brassica juncea)		
CLEARFIELD lentils	1 - 9 above ground nodes (1 - 6 leaf) (CLEARFIELD lentil)	
Field peas	1 - 5 above ground nodes (1 - 6 leaf) (field peas)	

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Crop	Stage	Rate
Fenugreek (seed production)	1 - 4 leaf	Odyssey: 17.2 grams/acre + Merge: 0.5% v/v (0.5 L/1,000 L spray solution)
Alfalfa (seedling or established grown for seed)		
Bird's-foot trefoil (seed production)		
Soybean	1 - 3 true leaves	
Fababean	1 - 6 leaf stage	

Weeds, Rates and Staging

Canopies: 1 - 4 major stem leaves, weed stems are visible.

Broadleaf weeds: Cotyledons to 4 leaf stage, unless otherwise noted.

Grassy weeds

barnyard grass	volunteer barley	wild oats
green foxtail	volunteer oats	
Persian darnel	volunteer wheat (except CLEARFIELD)	

Broadleaf weeds

chickweed	redroot pigweed	volunteer canola (resistant to 2,4-D)
cleavers (up to 4 whorls)	Russian thistle[1,2,3]	wild buckwheat[1]
flixweed	shepherd's purse	wild mustard
green smartweed	stinkweed	
hemp nettle[1]	stork's bill	
devil's paintbrush[1,2]	volunteer canola (non-CLEARFIELD resistant canola only)	

[1] Suppression in field peas and CLEARFIELD resistant lentils [2] Suppression in field peas, CLEARFIELD lentils, and CLEARFIELD canola [3] Suppression in CLEARFIELD lentils

Registered Tank Mixes

Tank mix partner	Odyssey + tank mix partner rate	Additional weeds controlled
CLEARFIELD canola		
Lontrel	Odyssey: 17.2 grams + Lontrel: 170 - 227 mL/acre	All weeds controlled by Odyssey + Canada thistle

[1] Apply when Canada thistle plants are actively growing. Lontrel at 160 mL/acre will provide top growth control of Canada thistle for 6-8 weeks, while the 226 mL/acre rate will provide season-long control of top growth.

Application Information

Units: Apply with ground equipment only. **Water Volume:** 40 L/acre.

Application Tips

Water soluble bags will dissolve better when bags remain dry, do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Odyssey if temperatures of <5°C are forecasted within 7 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is temporary and should not affect yield. Use 50 mesh or coarser filter screens.

How It Works

Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seedbed, shallow germinating flushing weeds (see wild oats) expected until crop flowering. Moist conditions result in better residual control.

Expected Results

Susceptible weeds stop growing within 24 - 48 hours. Yellow, stripping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 7 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

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Restrictions

Rainfall: Do not apply if rain is expected in 1 hours. **Irrigation:** Do not graze treated areas. CLEARFIELD 'W 5333' canola or cut for fax; sufficient data are not available to support such uses. Field peas treated with Odyssey may be fed or threshed 14 days after application. **Pre-harvest Intervals:** Wheat 30 days; field pea, lentil, canola, field peas, fenugreek (for seed uses only) and lentils can be harvested 7(W) days after last use. **Re-cropping:** Barley, CLEARFIELD canola, durum wheat, field corn, field peas, lentils and CLEARFIELD lentils may spring wheat and 'W 5333' can be grown safely the year following an application. Flax, and CLEARFIELD canola and sunflowers can be grown in the second year after an Odyssey application (e.g. if you used Odyssey in 2020, you can grow any CLEARFIELD canola in 2021). Research trailers have shown that flax, and CLEARFIELD canola and any CLEARFIELD sunflowers may be safely planted two (2) years following (SEPTEMBER 'W/W) Horticultural application in all regions of Western Canada except the Peace River Region of Alberta and British Columbia. In the Peace River Region, wait a minimum of 1 years and perform a field fire-away the crop prior to planting canola. For other crops, call BASF at 1-800-[illegible]. Crambe, a field fireweed, the crop before growing any crops other than those listed above. In case of crop failure, replant only to CLEARFIELD canola or field peas.

Environmental Precautions

Odyssey is highly toxic to non-target plants. A buffer zone of 10 metres is required between ground and sensitive habitat.

Toxicity

Low acute toxicity. Acute oral LD_{50} more > 5,000 mg/kg. Non-toxic to fish, birds and bees.

Storage

Store at temperatures above 0°C. Keep unused water soluble bags in unopened, original container. Keep packages dry at all times.

Odyssey Ultra

Group 2 / B

Formulation

Product	Company	Active Ingredient	Concentration	Container size
Odyssey Ultra A (FOR 2-PACK)	BASF Canada	Imazamox 40% + imazethapyr 20%	1000	2 x 60.0 g
Odyssey Ultra B (FOR 2-PACK)		Safeneptyl 400 g/L	1L	2 x 4 L jug
Merge (FOR 2-PACK)		Surfactant blend 10%		2 x 1 mL

Use one mate 40 acres.

Note: The Merge surfactant is included in the package.

Crops, Staging and Rates

Crop	Stage	Rate
CLEARFIELD canola	1 - 5 whorl ground rosette (1 - 4 leaf CLEARFIELD spot	Odyssey Ultra A: 1.2 g/acre + Odyssey Ultra B: 240 mL/acre + Merge 1.0% v/v 0.5% v/v (NIS, spray solution)
Field pea	1 - 5 whorl ground rosette (1 - 4 leaf	
CLEARFIELD Canola	2 - 4 leaf stage	
CLEARFIELD 'W/W canola	2 - 4 leaf stage	

Glands and Imaging

Examples: [illegible]

Bloodfluid vessels: [illegible]

Exams

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	

Bloodfluid vessels

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]		

[illegible]

Registered York Glass

[illegible]

Application Information

Note: [illegible]

Applicants on Tips

[illegible]

Glass in Blocks

[illegible]

Registered Results

[illegible]

Questionnaire

Example: [illegible]

[illegible]

Environmental Precautions

All AVO containers must register or upon before it, application or testing of equipment or diagram of it every.

Cooling

Unit with thumb. Insert card 65, case = 1,000 rigidly. Remove or fold, blade and face.

Storage

Store at temperature often (°C). Drugs stored over exhibit rings or modern, organic solutions.

Optica Trio

Formulation

Ingredient	Purpose	Concentration (w/w)	Function	Reference No.
Methyl hydrolase alpha	Enzyme, 60 kD	0.05% – 0.2%	Catalyst	E-1142
	Stabilizing salt	0.5 mM		
	Glycerol	5% (v/v)		

* Enzyme stabilized on use.

Drugs, Dropping and Store

Drug	Dosage	Age
Alcohol spring device	1 mL per dose, 2 to 3 times daily	18 – 110 years
Aloe	0.5 mL once daily, with or without food	
Bone	Apply to affected area twice daily	
Bone clean	Mix in a bowl, do not swallow	

Note: Ingredients and dose may be recommended in drug or store containing. Pre-use, pharmacist, and store conditions.

Mouth, Bone and Dropping

Adverse Event	Rate
Dizziness, skin rashes, bone pressure, stomach upset	1 in 10 to 1 in 100
Allergic reaction, severe stomach pain, severe diarrhea, and vomiting	1 in 1,000 to 1 in 10,000
Hepatic failure in 1 store drug	1 in 10,000 to 1 in 100,000
Stomach bleeding, do not take	1 in 100 to 1 in 1,000

Drug Interactions / Food / Effects

Optica Trio may be used around with alkaline (10 kD). Reduce 0.5 kD, or liquid and if more changed. Do not use with grapefruit juice and avoid in store daily. Do not use, store, and in bone, or use.

Medication Information

Day 30 – 90 days of exam eye and with prevent options. Do not apply for use.

Medication Tips

Do not – Will use light and, per person of application. Any 20 pair – Will use and Optica. For multimode. Medical profile operation under, and eye drug to the store.

Drug & Alcohol

Optica Trio is a bone, give emergency, seizure, toothbrush.

[illegible]

Approved Results

[illegible]

Restrictions

[illegible]

Environmental Precautions

[illegible]

Testing

[illegible]

Storage

[illegible]

[illegible]

Accessories

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Arrays - Weighing and Mixing

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Blends - Stirs and Weighing

[illegible]

Equipment

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Registered Sub-Class

[illegible]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]:
[redacted]

[redacted]

[redacted]

[redacted]

[

Weeds and Staging

Weeds controlled at the 1 – 8 leaf stage unless otherwise specified by the Paradigm label.

Weeds Controlled

Canada fleabane (up to 10 cm high)	round-leaved mallow (1 – 6 leaf)	volunteer alfalfa (up to 25 cm in height)
chickweed*	shepherds-purse	volunteer canola*
cleavers (1 – 6 whorl stage)**	smartweed (tatarian thumb)	volunteer flax (up to 10 cm in height)
common ragweed (up to 6 leaf)	sow thistle, annual (up to 6 leaf)	wild buckwheat
flixweed (up to 6 leaf and 8 cm high)	stinkweed	wild mustard
redroot pigweed	wild oat	

Weeds Suppressed

Canada thistle (re-tasking)	hemp-nettle (1 – 6 leaf stage)**	kochia

* Light to moderate infestation (up to 100 plants/m² up to 10 cm in height), including Group 2 resistant biotypes.

** With pre-control volunteer (notwithstanding relevant weeds (Clearfield) varieties).

*** Including Group 2 resistant biotypes.

Registered Tank Mixes

In spring wheat, durum wheat, and winter wheat, annual grass or added broadleaf control.

Tank mix partner*	Product rates
Simplicity + Ag Surf or Agral	200 mL/ acre + 1.25% V/V surfactant
MCPA Ester	332 mL/acre - no added surfactant required to mixes with this product
Lontrel 360	420 mL/acre - no added surfactant is required in mixes with this product

* No surfactant is required if Paradigm and Simplicity are mixed (MCPA or Lontrel 360).

Tank mix partner*	Product rates
In spring wheat and durum wheat for annual grass control and broadleaf control	
Lontrel 360	140 g - 210 mL/acre + Ag Surf or Agral at 1.25% V/V
Lontrel 360 + MCPA Ester 600	140 g - 210 mL/acre + 332 mL/acre MCPA + Ag Surf or Agral at 1.25% V/V
In spring wheat and barley for annual grass control	
Avadex 480 EC	250 mL/acre + foliage at 25 L/acre
Avadex 480 EC + MCPA Ester 600	250 mL/acre + 332 mL/acre MCPA Ester + foliage at 25 L/acre

* No surfactant is required for Paradigm when mixed with Avadex.

Application Information

How to Apply: Ground only. **Water volume:** 20 – 60 L per acre.

Application Tips

Nozzles and Pressure: Use a nozzle combination and pressure designed to deliver thorough even coverage with ASAE droplet category indicated on labels of tank mix partners. DO NOT apply with spray droplets smaller than coarse classification. Boom height must be 60 cm or less above the crop or ground.

How it Works

Paradigm is a selective post-emergence herbicide for the control of hard-to-kill annual broadleaved weeds. Paradigm must be applied only post-emergence to the main flush of actively growing broadleaved weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Paradigm by allowing maximum foliar uptake and activity. For best results, ensure thorough spray coverage of target weeds. Paradigm is a mixture of a cyclohexanedione herbicide (Group 1) and an imidazolinone herbicide (Group 2). The product controls weeds by disrupting normal plant growth patterns and/or by inhibiting production of the enzyme essential for production of certain amino acids essential for plant growth.

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Expected Results
Weeds start to twist between 2 - 20 days after spraying, dependant on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown and then die.

Restrictions
Rainfall: Rainfall within 1 hour of application may reduce effectiveness of the herbicide. Grazing: Livestock may be grazed on treated crops 7 days following application. **Re-entry:** Do not enter the treated field for 12 hours. **Pre-harvest Interval:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** Fields previously treated with Paradigm can be seeded after a minimum of 10 months to spring wheat, spring barley, canola, flax, Juncea canola, field pea, oriental, brown and yellow mustard, soybeans, sunflower, or fields can be summerfallowed. Lentils can be planted 22 months after application of Paradigm.

Environmental Precautions:
1 metre buffer zone required between treated area and terrestrial and water habitats.

Toxicity
LD_{50} (rats) > 5,000 mg/kg

Storage
Store in original containers in a secure, dry, well ventilated storage.

Pardner/Koril/Bromotril II/Brotex/Bromax

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pardner (PCP# 18885)	Bayer CropScience	Bromoxynil 280 g/L	Emulsifiable concentrate	9 L jug, 120 L drum
Koril (PCP# 25397)	Nufarm Agriculture	Bromoxynil 235 g/L		9.7 L jug, 120 L drum
Bromotril II 240 EC (PCP# 28537)	AGRIMS Canada	Bromoxynil 235 g/L		2 x 9.7 L jug, 110.4 L drum
Brotex 240 (PCP# 28619)	IPCO	Bromoxynil 240 g/L		9.7 L
Brotex 280 (PCP# 28619)	IPCO	Bromoxynil 280 g/L		9.7 L
Lontrel Bromax (PCP# 31,999)	Loveland Products Canada Inc.	Bromoxynil 480 g/L	Liquid	9.7 L

Crops, Staging and Rates
Check label for registered crop uses. Not all products are registered on all listed crops.

Crop	Staging	Rate/acre		
		Bromotril II	Pardner	Koril/Bromotril/Bromax
Barley, oats, spring wheat (including durum), triticale	2 leaf to early flag	284 - 284 mL	400 - 500 mL	467 - 567 mL
Winter wheat	Fall: 2 - 4 leaf. Spring: first growth to early flag leaf	284 - 284 mL	400 - 500 mL	467 - 567 mL
Corn	4 - 8 leaf	284 - 284 mL	400 - 500 mL	467 - 567 mL
Canaryseed (seed production)	2 - 5 leaf	284 mL	400 mL	467 mL
Seedling alfalfa	2 - 4 trifoliate leaf	284 mL	400 mL	467 mL
Established alfalfa (seed production)	From time growth begins until alfalfa is 25 cm tall.	284 - 284 mL	400 - 500 mL	467 - 567 mL

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Pardner/Koril/Bromotril II/Brotex/Bromax (cont'd)

Crop	Staging	Rate/acre		
		Brotex 420	Pardner	Koril/Bromotril/Brotex
Fall rye	Spring only: time growth begins to the early flag leaf stage	244 - 284 mL	400 - 500 mL	487 - 567 mL
Flax	5 - 10 cm tall	244 mL	400 mL	487 mL
Seedling grasses * (seed production)	2 - 4 leaf (establishment year only)	244 - 284 mL	400 - 500 mL	487 - 567 mL
Forage millet and sorghum	At or beyond the 4 leaf stage and less than 20 cm in height.	244 mL	400 mL	487 mL
Pearl millet** and sorghum		244 mL	400 mL	487 mL
Pre-seed burndown (zero-tillage)	Apply according to weed stage	244 mL	400 mL	487 mL

* Seedling grasses include: bromegrass, creeping fescue, meadow fescue, red fescue, orchard grass, reed canary grass, Russian wild rye, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass and tall wheatgrass. **Registered with Pardner and Bromotril.

Weeds and Staging

Seedlings up to 4-leaf stage

American nightshade	cocklebur	kochia (5 cm tall)	Russian thistle (5 cm tall)	wild mustard
annual smartweed	common ragweed	lady's-thumb	stinkweed	
bluebur	cow cockle	redroot pigweed*	velvetleaf (8 cm tall)	

Seedlings up to 8-leaf stage

common groundsel	tame buckwheat	volunteer buckwheat	wild mustard
lamb's-quarters	tartary buckwheat	wild buckwheat	

* Not controlled in alfalfa.

Registered Tank Mixes

Tank mix partner	Pardner® + tank mix partner rate	Additional weeds controlled
Pre-seed/Pre-plant application prior to seeding canola		
glyphosate (present as potassium or isopropylamine salt)	Rate: Pardner: 0.4 - 0.5 L/ac + glyphosate at 448 - 1782 g a.e/ha. Under adverse growing conditions or high populations of volunteer canola, the higher rate of Pardner will improve control.	Weeds controlled by glyphosate plus volunteer canola seedlings at the 1 - 4 leaf stage. DO NOT apply after seeding or crop emergence.
Spring wheat, including durum and barley (not under seeded to legumes)		
DO NOT apply after seeding or crop emergence	Rate: Bromoxynil: 113 g active ingredient/acre + 2, 4-D: 111 - 170 g active ingredient. Timing: 4 leaf to early flag leaf	Weeds controlled by Bromoxynil plus flixweed, shepherd's purse, volunteer sunflower, and ball mustard.
Achieve Liquid + Turbocharge/ Nuform Tralkoxydim (280 mL/acre) + Nuform Tralkoxydim adjuvant 0.5% v/v	Rate: Bromoxynil: 113 g active ingredient/acre + Achieve Liquid: 200 mL/acre + Turbocharge: 0.5% V/V. Timing: 2 leaf until early flag leaf	Weeds controlled by Bromoxynil plus wild oats, volunteer oats, green foxtail foxtail, barnyard grass and Persian darnel.
Avenge	Rate: Bromoxynil: 113 - 136 g active ingredient/ acre /acre + Avenge: 1.4 - 1.7 L/acre Timing: 2 leaf until 6 leaf	Weeds controlled by Pardner plus wild oats. Wild oats must be in the 3 - 5 leaf stage and broadleaf weeds in the seeding stage.
Avenge + MCPA	Rate: Bromoxynil: 113 - 136 g/acre + Avenge: 1.4 - 1.7 L/acre + MCPA: 113 - 222 g active ingredient. Timing: 2 leaf until 6 leaf	Weeds controlled by Pardner + wild oats, flixweed, shepherd's purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow-thistle, ball mustard and wormseed mustard.
Everest + surfactant (not to be used on barley)	Rate: Bromoxynil: 113 g/acre + Everest: 17 g/acre + Agral 90 or AgSurf: 0.25 % V/V. Timing: 1-leaf to 4-leaves on main stem, plus 2 tillers.	Weeds controlled by Pardner + wild oats (including Group 1 and Group 8 resistant biotype) and green foxtail (including Group 3 resistant biotype).

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Tank mix partner	Pardner® + tank mix partner rate	Additional weeds controlled
Horizon + Score	Rate: Bromoxynil: 113 g/acre + Horizon: 95 - 115 mL/acre + Score: 0.8 - 1.0 % V/V. Timing: 2 leaf to flag leaf	Weeds controlled by Pardner + barnyard grass, Persian darnel, green foxtail, and volunteer cereals.
MCPA	Rate: Bromoxynil: 113 g/acre + MCPA: 111 - 222 g active ingredient/acre. Timing: 2 leaf until early flag leaf	Weeds controlled by Pardner plus flixweed, shepherd's purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow-thistle, ball mustard and wormseed mustard.
Winter wheat		
2,4-D	Rate: Bromoxynil: 113 g/acre + 2, 4-D: 111 - 170 g active ingredient. Timing: 4 leaf to early flag leaf	Weeds controlled by Bromoxynil plus flixweed, shepherd's purse, volunteer sunflower, and ball mustard.
Achieve Liquid + Turbocharge/ Nufarm Tralkoxydim (200 mL/acre) + Nufarm Tralkoxydim adjuvant 0.5% v/v	Rate: Bromoxynil: 113 g/acre + Achieve Liquid: 200 mL/acre + Turbocharge: 0.5% V/V. Timing: 2 leaf until early flag leaf	Weeds controlled by Bromoxynil plus wild oats, volunteer oats, green foxtail foxtail, barnyard grass and Persian darnel.
MCPA	Rate: Bromoxynil: 113 g/acre + MCPA: 111 - 222 g active ingredient/acre. Timing: 2 leaf until early flag leaf	Weeds controlled by Pardner plus flixweed, shepherd's purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow-thistle, ball mustard and wormseed mustard.
Oats, fall rye, canary seed, seedling forage grasses and flax		
MCPA	Rate: Bromoxynil: 113 g /acre + MCPA: 111 - 222 g active ingredient/acre.	Weeds controlled by Pardner plus flixweed, shepherd's purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow-thistle, ball mustard and wormseed mustard.
Corn		
Atrazine	Rate: Bromoxynil: 113 g /acre /acre + MCPA: 111 - 222 g active ingredient/acre.	
Banvel II (field corn only)	Rate: Bromoxynil: 113 g /acre /acre + MCPA: 111 - 222 g active ingredient/acre.	

Application Information

With: Apply with ground equipment or by air in wheat and barley only. **Water Volume**: Corn: 80 - 120 L/acre. All other crops: 40 L/acre. Air: wheat and barley 8 L/acre.

Application Tips

Avoid spraying crops during adverse growing conditions, especially drought, high temperatures (over 29°C) or in high humidity.

How it Works

A contact herbicide so good coverage is essential. Inhibits respiration and photosynthesis causing death.

Expected Results

Weeds turn brown and die within 3 - 5 days - more rapid under good growing conditions and when applied to seedling weeds. Poor results can be expected if weeds past 4 leaf stage, poor spray coverage or lower than recommended rate used. Injury to corn may occur if under stress.

Restrictions

Rainfall: Rainfall within 2 hours of application may reduce weed control. **Grazing**: Wheat, barley, oats and seedling alfalfa - Do not use treated crops for grazing of livestock or green feed until 30 days after application. Do not cut treated crops for forage until 30 days after application. CAUTION: Do not graze other treated crops or cut for feed unless specified above; sufficient data are not available to support such use. **Re-cropping**: None.

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Environmental Precautions

Bromoxynil is moderately to highly toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic systems during application.

Toxicity

Moderate to high oral toxicity. Acute oral LD_{50} (rats) = 368 mg/kg. Very toxic to fish. Intake of a large dose may cause convulsions, sudden collapse and coma. Can be absorbed through the skin.

Storage

Pardner/Koril/Bromotril/Brotex formulations will solidify at temperatures below -20°C, but will be usable again at temperatures above 0°C.

Permit

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Permit (PCP# 31210)	Gowan Canada	Halosulfuron-methyl: 72.6%	WDG	567 g

Crops, Staging and Rates

Crop	Staging, rate and comments
Beans	**Pre-emergent (surface): 14.2 - 19 g/acre after seeding but prior to soil cracking.** Post-emergent: Apply 2 to 4 trifoliate leaves, prior to flowering. Maximum 1 application per year.
Corn (sweet, popcorn) Corn (field)	Apply 19 - 28.3 g/acre up to 10 - 12 leaf stage. A second application of 19 g/acre may be applied with drop nozzles, avoiding the whorl. Maximum 2 applications per year. Apply 19 - 37.6 g/acre up to 10 - 12 leaf stage. A 2nd application of up to 37.6 g/acre may be applied with drop nozzles. Maximum 2 applications per year.
Proso millet	Apply 14 - 19 g/acre from the 2 leaf up to prior to head emergence. Maximum 1 application per year.

Weeds Controlled

Weeds controlled from the 3 leaf stage. Refer to label for maximum leaf stage of individual weeds.

Weed controlled at 14 - 19 g/acre	Weeds controlled at 28.3 - 37.6 g/acre
Annual sunflower, Canada fleabane,cocklebur, common chickweed, common groundsel, corn spurry, creeping yellowcress, hairy galinsoga, northern willowherb, lamb's quarter, broadleaf plantain, prickly lettuce, purslane*, common ragweed, redroot and smooth pigweed, round-leaved mallow, shepherd's purse, smartweed, wild mustard, wild radish, velvetleaf, yellow nutsedge	Weeds to the left plus hedge bindweed, common milkweed*, horsetail*

* Applications to emerged weeds require the addition of a non-ionic surfactant with 80% or greater active ingredient content at the lowest labelled rate for the surfactant regardless of crop stage.

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Registered Tank Mixes

Dry beans: Eptam 1.72 - 2.12 L/acre at pre-emergent stage only. Requires incorporation.

Field corn: 2,4-D, Accent, Aatrex, Dicamba and glyphosate in glyphosate tolerant corn only.

Application Information

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions.

Application Tips

Do not apply by air. **Water Volume**: Minimum 40 to 55 L per acre. Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.

How it Works

Halosulfuron is a Group 2 herbicide that is absorbed by the foliage and roots, readily translocated throughout the plant and inhibits cell division. Symptoms on dying weeds may not be noticeable for 1 to 3 weeks after application depending on weed sensitivity, weed size, growing conditions and spray coverage.

Restrictions

Rainfall: Activity of foliar applications may be reduced if rainfall or irrigation occurs within 4 hours. Pre-emergent surface applications will benefit from some rainfall, but excessive rainfall (greater than 1 inch or 2.5 cm) shortly after application may result in injury, especially when seeding is shallow. **Re-entry Interval**: Do not enter treated field for 12 hours. **Grazing**: DO NOT graze or cut corn for livestock greenfeed within 30 days of the last application. Allow 30 days for sweet corn and 65 days for popcorn or grain corn from the last application to foliage and the harvesting of silage. Proso (crown) millet may be grazed immediately after treatment. DO NOT cut proso (crown) millet for hay within 37 days of application or feed straw within 50 days of application. **Pre-harvest Interval**: DO NOT harvest dry beans within 30 days of post-emergent applications. DO NOT harvest proso (crown) millet within 50 days of application. There is no pre-harvest interval indicated for grain corn.

Re-cropping Interval: Delay seeding the following crops for the interval indicated:

- dry common beans - no delay required
- field corn - 1 month;
- cereals (wheat barley and oats) - 2 months
- potatoes, peas forage legumes and soybeans - 1year
- canola and sunflowers - 2 years

Environmental Precautions

TOXIC to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified under DIRECTIONS FOR USE.

Toxicity:

Acute oral LD_{50} (rats) = 1,287 mg/kg.

Storage

Store in a cool, secure place. Do not store for prolonged periods in direct sunlight.

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Pinnacle SG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pinnacle SG (PCP# 30741)	E.I.duPont Canada	Thifensulfuron-methyl: 50%	Soluble granule	8 x 12 water soluble pouches

Crops, Staging and Rates

Crops	Rate (gm per acre)	Staging and specific comments
Soybeans*	3.3	Apply up to 4 inches (10 cm) tall or wide. Requires addition of non-ionic surfactant such as Agral 90, Agsurf at 1 L/1,000L of spray solution. Oil surfactants such as Assist at 0.4 - 0.8 L/acre or Sure-Mix at 0.5% v/v may be used as adjuvants.
	4.8	Requires addition of non-ionic surfactant such as Agral 90, Agsurf at 1 L/1,000 L of spray solution. Oil surfactants such as Assist at 0.4 - 0.8 L/acre or Sure-Mix at 0.5% v/v may be used as adjuvants.

* Crop tolerance is best when applied up to the 2nd trifoliate stage.

Weeds Controlled

Low rate: Lady's thumb, redroot pigweed, wild mustard.

High Rate: the previous low rate weeds plus lamb's quarters and velvetleaf (addition of 28-0-0 liquid fertilizer at 4L/100L of spray solution or 2.4 kg of 46-0-0 dry urea fertilizer may improve control of velvetleaf).

Registered Tank Mixes

Tank mix partner	Tank mix rates
Assure II	(0.2 L/acre) plus Sure-Mix
Basagran	(0.71 or 0.91 L/acre) plus Assist adjuvant
Basagran Forte	(0.71 or 0.91 L/acre)*
Assure II	(0.25 L/acre) plus Basagran Forte (0.71 or 0.91 L/acre) plus Sure-Mix adjuvant*

*Refer to appropriate labels for Pinnacle and adjuvent rates of application.

Application Information

How to Apply: Apply with ground equipment. **Water volume**: Ground sprayers - 45 L/acre.

Application Tips

Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Pinnacle applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days of application may also result in crop injury. Weeds under stress conditions at time of application may not be adequately controlled. Injury symptoms can be crop discolouration (yellowing, purpling or reddening) or stunting.

How it Works

Pinnacle rapidly stops growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility.

Restrictions

Rainfall: Up to 1 inch of rain beginning 1 hour or more after spraying will not reduce Pinnacle effectiveness. Several hours of dry weather are needed after application to allow uptake by the plants. **Grazing**: Do not graze or cut for feed. **Pre-harvest intervals**: Minimum time (PHI) between application and harvest is 60 days.

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Re-entry: Do not re-enter treated area until 12 hours after application. **Re-cropping**: Do not plant any crop other than wheat or barley for 30 days after application.

Environmental Precautions
Observe buffer zones specified under DIRECTIONS FOR USE.

Toxicity
Low acute toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, feed or food. Not for use or storage in or around the home. Keep container tightly closed and dry. Do not freeze.

Pixxaro

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pixxaro A (PCP# 31303)	Dow AgroSciences Canada	Halauxifen, methyl ester: 16.25 g/L Florasulam: 250 g/L	EC	1 X 4.91 L
Pixxaro B (PCP# 29622)	Dow AgroSciences Canada	MCPA Ester: 600 g a.e./L	EC	1 X 4.45 L

Crops, Staging and Rates

Crop	Staging	Rate
Spring wheat (including durum), winter wheat and barley	3 leaf stage to just prior to flag leaf emergence	Pixxaro A at 125 ml/acre + Pixxaro B at 225 ml/acre (40 acres/case)

Weeds and Staging
Weeds controlled (up to 10 cm in height or diameter unless otherwise specified), including Group 2 resistant biotypes.

Weeds Controlled

buckwheat, wild (1 - 8 leaf)
burdock (before the 4 - leaf stage)
Canada fleabane
canola, volunteer (1 - 8 leaf)
chickweed (1 - 8 leaf) *
cleavers (1 - 9 whorl)*
flax, volunteer (up to 15 cm in height)
flixweed
hemp-nettle (1- 8 leaf)
kochia (up to 15 cm in height)*
lambs-quarters (1 - 8 leaf)
mustard, wild*
pigweed, redroot (1 - 8 leaf)
ragweed (common, false, giant)
round-leaved mallow
shepherds-purse
stork's bill
sow thistle, annual*
volunteer alfalfa (up to 25 cm)

* suppression

* including Group 2 resistant biotypes.

Registered Tank Mixes
Combinations with Pixxaro co-pack for annual grass control

Tank mix partner	Crops registered	Rate/ha	Adjuvant rate	Additional weeds controlled
Liquid Achieve EC	Spring and durum wheat, barley	0.5 L/ha	Turbocharge at 0.5% v/v	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, Persian darnel

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Picoxaro (cont'd)

Tank mix partner	Crops registered	Rate/ha	Adjuvant rate	Additional weeds controlled
Avast 140 EC	Spring wheat, barley	0.6 L/ha	Adigor at 0.7 L/ha	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet
Horizon 240EC	Spring and durum wheat	0.23 L/ha	Score at 0.5% v/v	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed
Horizon 60	Spring and durum wheat	0.93 L/ha	None required	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed
Poast 120 Super	Spring and durum wheat, barley	0.77 L/ha	None required	wild oats, green foxtail, yellow foxtail, barnyard grass
Poast Advanced	Spring and durum wheat, barley	1.02 L/ha	None required	wild oats, green foxtail, yellow foxtail, barnyard grass
Everest 2.0	Spring and durum wheat	36 - 72 mL/ha	Ag-Surf or Agral 90 at 0.25% v/v	wild oats, green foxtail, volunteer canola (at), green smartweed, wild mustard, shepherd's purse, stinkweed, volunteer canola. Consult Everest 2.0 label for rate-specific claims
Treoss	Spring and durum wheat	1.2 L/ha	None required	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet, Persian darnel

Nova Agrochemicals also supports the following mixes not listed on the Picoxaro label. Herbicidal activity, flexibility, tank mixing requirements or the right rate is critical for optimum performance. Check labels of products to be mixed.

Application Information

How to Apply: Ground or aerial applications. **Water volume:** 20 - 40 L per acre by ground sprayer, 10 L per acre by air.

Application Tips

DO NOT apply with spray droplets smaller than coarse classifications. Boom height must be 60 cm or less above the crop or ground.

How It Works

Picoxaro is a systemic herbicide that moves within the plant for control of exposed and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms of weeds include: cessation/stunting of the stems and rootlet nodes. Warm, moist growing conditions promote active weed growth and enhance the activity of Picoxaro by allowing maximum foliar uptake and activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

Expected Results

Weeds start to twist between 2 - 20 days after spraying, dependent on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown then die.

Restrictions

Rainfall: Rainfast within 1 hour of application. **Grazing:** Livestock may be grazed on treated crops 21 days following application. **Pre-harvest Interval:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** Fields previously treated with Picoxaro can be seeded after a minimum of 10 months to spring wheat, spring barley, oats, canola, flax, field peas, mustard, or fields can be summerfallowed. Lentils can be planted 12 months after application of Picoxaro.

Environmental Precautions

For tank mixes, consult the labels of the tank mix partners and observe the largest crop rotation buffer zone of the products involved in the tank mixture.

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Toxicity

Acute Oral LD_{50} rates 5,000 mg/kg for Poast Ultra 4. Acute Oral LD_{50} rates 1,797 mg/kg for Poast Ultra 8. Prevent skin exposure. Warning: eye and skin irritant.

Storage

Store in original containers in a secure, dry, locked storage.

Poast Ultra

Group 1

Formulation

Product	Company	Active Ingredient	Concentration	Container size
Poast Ultra (EPA# 7969-)	BASF Canada	Sethoxydim, 450 g/L	Emulsifiable concentrate	1 L, 4 L, 5 L, 20 L, 208 L

Note: Merge adjuvant required for Poast alone or with any registered broadleaf herbicide.

Crops, Staging and Rates

No crop restrictions

Maximum application rate: 0.45 L/acre + Merge @ 0.5% V/V

alfalfa
alsike clover*
beans (white, kidney, pinto, adzuki, faba, lima, mung)
flaxseed (annual)
canola (including Roundup Ready, Liberty Link and CLEARFIELD canola)
celery
chickpea (dry)
cow vetch*
creeping red fescue (for seed production only)
dry field peas
fababeans
fenugreek
flax (including low linolenic and solin varieties)
lentils
lupins
mustard
potatoes
sainfoin*
safflower
sweet clover
sugar beet
low and shrub unwanting of spruce, colorado spruce, scots pine, douglas fir, unwanting, white, potato, green ash, flax, buffalo berry, saskatchewan, potentilla, spirea, maple, viaburn

Maximum application rate: 0.45 L/acre + Merge @ 0.5% V/V

alsike clover**
canary
cow vetch**
corianda
dill
safflower
sainfoin**
vetch
sweet clover**

Maximum application rate: 0.23 L/acre + Merge @ 0.5% V/V

spring buckwheat

Maximum application rate: 0.15 L/acre + Merge @ 0.5% V/V

chickpea

* Established stand ** Seedings only

Weeds, Rates and Staging

Weeds	Stage	Rate	
		Poast Ultra (mL/ha)	Poast Ultra (fl oz/ac)
Barnyard grass, fall panicum, green foxtail, large crabgrass, Persian darnel, proso millet, volunteer corn, witchgrass, yellow foxtail	1 - 4 leaf	0.75 L/acre	0.81 - 1.22 fl.
Arbuscular cereals (barley, oats, wheat), wild oats in cereals, flaxdrive (suckers, sensitive) and peas	1 - 4 leaf	0.75 L/acre	
Arbuscular cereals (barley, oats, wheat), wild oats suppression	1 - 3 leaf	1.75 L/acre	
Quackgrass suppression	2 - 3 leaf	1.75 L/acre	
Quackgrass control plus annual grasses listed above	2 - 3 leaf	1.75 L/acre	
Forced barley suppression plus annual grasses listed above	2 - 3 leaf	1.75 L/acre	

Note: Merge adjuvant is volt equivalent.

Registered Tech Glows

Tech slot content	Frost Glow (+ tech slot content +5)	Additional tech interaction
Tech		
Lumen 4/5	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Lumen 4/5 for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and missile tools.
Illusion	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Illusion for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and ultrasonic spray tools. Direct-injection pathogens, with caution.
Illusion + Lumen 4/5	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Illusion & Lumen 4/5 for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and missile tools are all in stock.
Tech (not Lumen)		
Vesta 1/2, 4/5	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Vesta 1/2, 4/5 for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and missile compatible tools.
Tech		
Aurora ✪	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Aurora ✪ for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and ultrasonic compatible tools.
Lyra ✪	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Lyra ✪ for 1 ⚔, 2 ✦ turns)	
4D-X core	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ 4D-X core for up to 2 ⚔, 2 ✦ turns)	
Lumen 4/5	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Lumen 4/5 for 1 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and missile tools.
Lumen 4/5 + 4D-X	Frost Glow (+1 ⚔, 2 ✦) / Mirage (+2 ⚔, 1 ✦) (+5 ✦ Lumen 4/5 + 4D-X core for up to 2 ⚔, 2 ✦ turns)	Frost Glow compatible spray, sweep and ultrasonic tools are 4D-X compatible.
Tech (core)		
Nexus	Frost Glow (+1 ⚔ core) / Mirage (+2 ⚔ core) (+5 ✦ Nexus for 4 ⚔ turns)	Ultrasonic protocols, sweep, spray, probe, missile, and 4D-X tools are compatible without exposure risk to animals, personnel, and facilities.

Application Information

Note: Apply work-around equipment or for use. **Frost Glow** (Concept: 20+ ml 1:1 tank / Water Mirage, Nano-Mirage, Nano-Mirage) Nano-Mirage, Nano-Mirage, Nano-Mirage,

purpose. Rogue's Wine is carefully paced through the apothecary above the city. We receive eight bills, and not, and may be more than, as a bill to take a package to someone. Increasing. We must make a bill to our qualified and for the night. Light source and use source Rogue Wine bottle. The source for a bill can be a qualified user's [illegible] or public utility installation. Depending on processing conditions, a bag within bottle generates water and a magnesium.

Characteristics

Standard. Standard's unique use class of applications easy, unless the current system. **Grinding.** We can prove the lowest song in us for the. ... sufficient data, as 28 is available to suggest a sort job. Forage locations delivered to the client may be up to the day, and delivery per hour in a bank for use. Utilities as "[illegible]" for use, such as a client's order, and standard prices for 1.7 hours.

Key data and characteristics

Item	Measurement Basis	Item	Measurement Basis
Activity	1 case	Average diameter	1.5 cups
Blade, chilly	1 case	Candle and emergency	1.5 cups
Branch specific	1 case	Library	1.5 cups
Businesses	1 case	Lake	1.5 cups
Candle	1 case	Mineral	1.5 cups
Cooking drink	1 box	Pump	1.5 cups
Dry powder body	1 case	Software	1.5 cups
Durable	1 case	Valve	1.5 cups
Hardware	1 case	Wallpaper	1.5 cups
Key	1.5 cups		

Forage agencies include white wine, wax blended, candle and metal body.

Re-engaging. A glass bucket stand at 41.5° F days in a segment list, all songs when Rogue Wine Vendor as the client.

Environmental Precautions

Rogue's Wine is not to in opposite suggestions and beverage a renowned planet. Where a facility, cause specified as the client.

Sourcing

Local cause economy. Scale cost 0.01_1 date 1 — 0.000 rigidity.

Storage

Store grinder in a cool, dry place. Forage cell can collect efficient waste.

Predictable

	Change (+/-)

Associated risks

Product	Property	Work Experience	Experience	Standard Use
Cylinder Excellent (2002) [1.0 kg]	1.5 gallon bucket	Chemical name 28 [illegible]	28	28 cups cook
Professional Soap (2012) [1 kg]	1.5 gallon bucket	Time measure valley [illegible]	Inspection	0.5 L
Tungsten (2012) [illegible]	1.5 gallon bucket	Company 28 years	28	1.5 qt
Valve (2012) [1.0 kg]	Public agriculture	2000 year [illegible]	28	1.5 qt

The large tiny protocol tablet of Forge Protection (2012) for city (2012) Big Cut Medium in a [illegible]

Product Lookup

Drops, Purging and Rinse

Name	Quantity	Unit
Drops, Purging and Rinse	1	each
	2	each
	3	each

Drops, Purging and Rinse

Goods and Purging

A easy credit. Light 12 rich history, give energies of terrible.

Name	Quantity
Natural body	1
Deep cook	1
Heavy rock	1
Natural rock	1
Heavy rock	1
Natural rock	1
Deep cook	1
Natural rock	1
Natural body	1

Wooden credit. Light 12 sight run away, cent bit, give lay credit fall up hot rain. Fit run to bright a distance, alone offer run cell phone.

record compound quiet moderate	nurse smoke quiet bird bottle	medical sound 1 credit
fall 1 credit	sleep 1 credit	dream pay mountain
stock cook thousand scared	cook dance	thought
cell phone	dance bird heart quiet	thought 1 credit
cook sound 1 credit	fall 1 credit	cook 1 credit
dance 1 credit	cook 1 credit	cook 1 credit
run cook	dance quiet	dream 1 credit
quality 1 credit	dance quiet 1 credit	cook 1 credit
dance	dance bird	dance bird
dance bird	cook 1 credit	dance bird

Spring Wood milk. Run quiet, equipment cook water window, still ask recipe of hour. Affordable wallet, fall cook 12 money quickly hour. Offer 1 bill cook, talk environment negative run fit. Lawyer 1 bill, satisfied 12 1 cook bill 1 property 12 1 1 cook bill 1 property.

Money Wood milk. Run quiet, equipment cook water window, still ask recipe of hour. Affordable wallet, fall cook 12 money quickly hour. Offer 1 bill cook, talk environment negative run fit. Lawyer 1 bill, satisfied 12 1 cook bill 1 property 12 1 1 cook bill 1 property.

Registered Hold Allow

Hold.

Application Information

Walk 1 minute questions. Water 1 tobacco 1 minute 12 1 hour.

Driving Instructions

Sport 1 12 1 hour cent sleep, quiet walk. Offer talk to hold fall cook sound. Offer patient meeting, deposit negative cook 12 1 hour go. Invitation 1 holiday, question cook suggest fall. Mount 12 1 hour fit, allergy interest cook. Invitation 12 1 12 1 hour. Mountain celebrate question, deposit run 12 1 cook.

Application Age

Water open, window run accident who allow, copy away, watch dog 1 cook. Profession fall 12 hot walk to cook.

Package Instructions Drug Prescription Office run bill dog 1 hospital 12 1 1 1

Error Codes

Replacement Procedures

Diagnostic Procedures

Testing

Storage

Preface 6C Preface Plus

Accessories

Safety Alert

ProPass 6C/ProPass Flex (cont'd)

Crops, Staging and Rates

Crop	Staging	Rate
Pre-seed weed burndown	Apply prior to planting barley, oats, durum, winter and spring wheat to control emerged labelled weeds.	ProPass 6C A: 40 mL/acre ProPass 6C B: 375 mL/acre ProPass Flex: 0.1 gm/acre and may be mixed with all glyphosate salt formulations
Summerfallow	Apply for control of labelled weeds.	
Fall stubble applications	Apply in the fall to control annual broadleaf weeds and grasses prior to spring seeding of wheat (including durum), winter wheat, barley and oats.	

Weeds and Staging

Grasses controlled at 2 - 4 leaf stage

downy brome	Persian darnel	wild oats
giant foxtail	volunteer barley	
green foxtail	volunteer wheat	

Broadleaf weeds controlled at 2 - 4 leaf stage

annual sow-thistle*	bedstraw	smartweed
Canada thistle***	bully's thumb	stinkweed
cleavers	bunk's quarters	volunteer canola, including Roundup Ready and CLEARFIELD
common chickweed	narrow-leaved hawk's beard**	volunteer flax
common ragweed**	perennial sow-thistle*	wild buckwheat (2 - 5 leaf)
dandelion, seedlings and overwintered rosettes, mature plant up to 30 cm	redroot pigweed	wild mustard
fanweed	Russian thistle	
hemp-nettle	scentless chamomile	
	shepherd's purse	

* Suppression with ProPass ** Up to 8 cm in height

Application Information

Drift: Apply with ground equipment only. Do not apply by air.

Water Volume: 20 - 40 L/acre.

Application Tips

Pre-seed weed burndown/summerfallow: ProPass must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of ProPass by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds. Reduced control may also occur when applied to weeds heavily covered in dust.

Fall stubble: Propass can be applied until late October, but active weed growth must be present.

How it Works

ProPass 6C A and ProPass Flex are taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. ProPass B is a non-selective systemic herbicide that moves through foliage into the roots, resulting in plant mortality.

Expected Results

Weeds susceptible to ProPass A or ProPass Flex will stop growing almost immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 - 10 days after application. Annual weeds susceptible to Propass B or glyphosate applied with ProPass Flex will wilt and yellow within 2 - 4 days. Perennials will show similar symptoms within 5 - 10 days after application.

Restrictions

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, reducing effectiveness. Do not apply if rainfall is imminent at time of application. **Cropping:** Do not graze treated areas within 7 days of application. **Re-cropping:** Pre-seed burndown application - Fields treated with ProPass herbicide tank mix can be seeded to barley, oats or wheat in the year of application. Summerfallow application: Fields treated with ProPass herbicide tank mix can be seeded to barley, canola, durum wheat, peas, wheat the following spring. Canola and Peas can be grown if fallow application occurred prior to August 1 in the fallow year.

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Environmental Precautions
Overspray or drift to sensitive habitats should be avoided. A buffer zone of 30 metres is required near sensitive habitats.

Toxicity
PrePass has an extremely low acute toxicity. Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

Prestige XC

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Prestige XC A (PCP# 29662)	Dow AgroSciences	Fluroxypyr: 333 g/L	Emulsifiable concentrate	3.3 L or in bulk 4 x 2 x 9.9 L
Prestige XC B (PCP# 29664)		Clopyralid: 50 g/L + MCPA: 280 g/L		2 x 8.0 L or in bulk 4 x 96 L

120-180 acres/1 drum and 2 jugs

Crops, Staging and Rates

Crop	Timing	Rate
Barley, canarygrass, oats, wheat, excluding durum and winter wheat	3 leaf stage until flag leaf emergence 3 leaf to just before flag leaf – winter wheat	**Low Rate:** 27 acre per case rate Prestige XC A at 0.13 L/acre plus Prestige XC B at 0.6 L/acre controls the weeds shown below. **High Rate:** 20 acre per case rate Prestige XC A at .17 L/acre plus Prestige XC B at 0.8 L/acre controls the low rate weeds plus additional weeds shown below.
Forage grasses (seedling or established stand) grown for seed production: Creeping red fescue, intermediate wheat grass, crested wheat grass, meadow brome grass, smooth brome grass, tall fescue, timothy	4 leaf – flag leaf stage	

Caution: Do not apply to crops underseeded with legumes.

Weeds, Rates and Staging
Apply at 2 - 4 leaf stage, unless otherwise stated

Low rate:

- burdock
- Canada thistle * (low infestation)
- cleavers (1 - 4 whorls)
- cocklebur
- field horsetail (top growth control)
- flixweed (rosettes only)
- kochia
- lamb's quarters
- plantain (top growth control)
- prickly lettuce
- ragweeds
- shepherd's purse
- stinkweed
- stork's bill ** (1 - 8 leaf)
- vetch
- volunteer flax (1 - 12 cm)
- volunteer sunflower
- wild buckwheat (1 - 8 leaf)
- wild mustard
- wild radish

High rate:

- annual sow thistle
- Canada thistle (medium to high infestation)
- common chickweed**, * (up to 5 cm)
- common groundsel
- dandelions (rosettes only)
- hemp nettle (2 - 6 leaf)
- perennial sow thistle*
- redroot pigweed
- round-leaved mallow (1 - 6 leaf)
- Russian pigweed
- scentless chamomile
- smartweed
- stork's bill
- tartary buckwheat
- volunteer canola

* Season-long control of thistle with some regrowth in the fall (top growth control) ** Suppression * Including biotypes resistant to Group 2 herbicides

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Prestige XC (cont'd)

Registered Tank Mixes

Tank mixes	Tank mix partner rate	Additional weeds controlled
Barley, spring wheat, (excluding durum		
Achieve Liquid + Turbocharge	200 mL per acre + Turbocharge: 0.5 % v/v	Green foxtail, wild oats
Assert SC 300 + Acidifier	0.53 mL/acre plus acidifier	Wild oats (1 - 3 leaf stage)
	650 mL/acre plus acidifier.	Wild oats (4 leaf stage)
Pume Advance	413 mL/acre	Green foxtail, wild oats, and barnyard grass
Spring wheat, (excluding durum		
Everest + non-ionic surfactant	17.4 g/acre + Agral 90 or AgSurf: 0.25 % V/V	Green foxtail, wild oats
Horizon + Score	93 mL/acre + Score: 1.0 V/V	Green foxtail, wild oats
Bengal, Cordon, WildCat	156 mL/acre	Green foxtail
	312 mL/acre	Green foxtail, wild oats
Simplicity	150 - 200 mL/acre	Wild Oats, Japanese brome, downy brome (suppression), barnyard grass, yellow foxtail, green foxtail (suppression). Consult label for added broadleaf weeds.
Spring wheat and barley excluding durum		
Axial	243 mL/acre + Adigor: 283 mL/acre	Wild oats and green foxtail

Application Information

With: Apply with ground equipmentor by air. **Water Volume**: 20 - 40 L/acre Ground, 12 - 20 L/acre air.

Application Tips

Prestige is a non-residual herbicide and will only control emerged weeds. Temperature range for optimum activity and control is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions. Wet foliage at time of application may result in reduced weed control. Common chickweed control: Prestige will only control chickweed that is emerged at time of application. Chickweed plants which emerge after application will not be controlled. To improve the reduction in chickweed population at the end of season, delay the timing of application as late as possible to when the majority of chickweed plants have emerged.

How it Works

The components of Prestige tank mix move within the plant to control exposed and underground plant tissue. The herbicide mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Weeds start to twist shortly after being sprayed. After twisting and bending, plants stop growing, turn brown and die. Difficult-to-control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow. Death may not occur for 14 - 21 days. Some weak Canada thistle regrowth may occur by the end of season

Restrictions

Rainfall: Do not apply if rain is expected within 6 hours. **Grazing**: Do not permit any grazing within 7 days after application. Do not harvest forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Intervals**: Do not harvest the treated crop within 60 days after application. **Re-entry**: Do not enter treated fields 12 hours after application. **Re-cropping**: Fields treated with Prestige herbicide tank mix can be seeded the following year to barley, canola, corn, flax, forage grasses, mustard, oats, peas, rye, sugarbeets, wheat or summerfallowed. Very dry soil conditions following application can result in a risk of injury to field peas grown in the following year. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year), delay seeding field peas an additional 12 months (22 months following application). Contact your local Dow AgroSciences representative or retailer for more information before seeding

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field peas following drought conditions in the previous year.

Do not seed crops other than those listed above for at least one year after treatment.

Environmental Precautions

This product is highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application or cleaning. Observe buffer zones specified on the label.

Toxicity

Prestige A: Very low mammalian toxicity. Acute oral LD_{50} (rats) = >2,000 mg/kg.

Prestige B: Clopyralid: Very low acute mammalian toxicity. Acute LD_{50} (rats) = > 2,000.
MCPA: Moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 700 - 800 mg/kg. May case burns upon contact with skin and eyes and can be absorbed through the skin.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

Primextra II Magnum

Group 5, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Primextra II Magnum (PCP# 25730)	Syngenta	S-Metolachlor: 400 g/L + atrazine: 320 g/L	Flowable	2 x 10 L jug

Crops, Staging and Rates

Crop	Staging	Rate
Corn, (field, silage, sweet)	Pre-plant incorporated or pre-emergence (only if irrigated within 10 days of application)	1.21 - 1.62 L/acre

Weeds and Staging

Pre-emergence

- American nightshade
- annual smartweed
- barnyard grass
- crabgrass
- Eastern black nightshade
- fall panicum
- giant foxtail
- green foxtail
- green smartweed[1]
- lady's-thumb
- lamb's-quarters[1]
- prostrate pigweed
- purslane[1]
- ragweed[1]
- redroot pigweed[1]
- tall waterhemp
- wild buckwheat
- witch grass
- yellow foxtail
- yellow nutsedge
- wild mustard[1]

[1] Some naturally occurring triazine tolerant biotypes of these weeds may not be controlled by Primextra II Magnum. Refer to company label for specific tank mix options.

Rate

Weed populations	Rate
Light infestation	1.2 L/acre
Medium infestation	1.4 L/acre
Heavy infestation	1.6 L/acre

Caution: Do not apply to soils with less than 1% or more than 10% organic matter.

Application Information

With: Apply with ground sprayers. Do not apply by air. **Water Volume**: 60 - 120 L/acre.

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Primextra II Magnum (cont'd)

Application Tips
For best results, apply Primextra II Magnum herbicide/fertilizer mixtures uniformly to the soil with properly calibrated equipment immediately after blending and incorporate according to label directions.

How it Works
Absorbed by roots and inhibits photosynthesis.

Expected Results
Weeds die at germination, or under dry conditions, die back soon after emergence.

Restrictions
Rainfall: Moderate rainfall after application will enhance activity. Heavy rainfall reduces weed control.
Re-cropping: Follow corn with corn only.

Environmental Precautions
This product is toxic to non-target terrestrial plants and aquatic organisms. Use buffer zones to reduce the possibility of drift or damage to sensitive aquatic and terrestrial habitats.

Toxicity
Very low acute mammalian toxicity. Acute oral LD_{50} (rats) = atrazine 3,080 mg/kg, metolachlor = 2,780 mg/kg, Primextra = 4,680 mg/kg. May cause severe skin irritation and perhaps eye injury.

Storage
Dry, heated storage preferred.

Princep Nine-T/Simazine 480

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Princep Nine T (PCP# 16370	Syngenta	Simazine: 90%	Water dispersible granules	5 x 5 kg bags
Simazine (PCP# 23181)	Loveland Products Canada	Simazine: 480 g/L	Flowable	2 x 10 L

Crops, Staging and Rates

Crop	Rate per acre		Staging
	Princep Nine T	Simazine 480	
Alfalfa (1 year or older)	0.45 kg	Not registered	Apply in the fall after last cutting but prior to permanently frozen ground conditions. One application per season.
Bird's-foot trefoil	0.45 kg	Not registered	For stands at least one year old, apply from September to November before permanently frozen ground conditions. Apply in year of seeding if population is at least 5 plants per 10 cm^2 and if plants are at least 15 cm high.
Corn	0.6 - 1.0 kg	1.4 - 3.4 L	Apply one week prior to seeding; incorporate to a depth of 2.5 cm. Use low rate on sandy soils, and the high rate on loams and clays.

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Crop	Rate per acre		Staging
	Princep Nine T	Simazine 480	
Raspberries	0.8 - 1.0 kg		Apply in early spring but not on young shoots.
Shelterbelts consisting of caragana, green ash, Siberian elm, American elm, and boxelder maple	2.0 - 2.8 kg	3.8 - 5.7 L	Apply in the fall or early spring, pre-emergent to weeds. Injury may occur to trees grown in saline soils.

Weeds and Staging

Apply prior to emergence of weeds in spring.

barnyard grass
crabgrass
lamb's-quarters*
lady's-thumb
perennial species starting from seed
purslane
ragweed*
smartweed
volunteer clovers
wild buckwheat
wild oats
yellow foxtail

*Some biotypes of these weeds may not be controlled by these products

Application Information

With: Apply with ground equipment only. **Water Volume**: 120 L/acre. Shelterbelts: 200 L/acre.

Application Tips

Gentle agitation required during mixing and spraying. After any break in the spray application, agitate thoroughly. Do not overlap application. Alfalfa, bird's-foot trefoil: Do not apply to same field for more than 3 consecutive years. Do not apply Gramoxone within 1 year after the Princep application.

How it Works

Acts through the roots of germinating weeds and inhibits photosynthesis, preventing emergence.

Expected Results

Weed-free ground.

Restrictions

Rainfall: Princep Nine-T requires rainfall to be activated, negligible effect on Simazine. **Grazing**: Allow 30 days between application and grazing to dairy and beef cattle and sheep, and 60 days between application and cutting for hay. **Re-cropping**: Only corn may be planted during the season of application. If rates greater than 0.8 kg/acre are used, only corn may be planted the following year. Injury may occur to succeeding crops of white beans, onions, peas, tomatoes and turnips if dry weather occurs during the year of application. Sugar beets should not be planted the year following Princep Nine-T application.

Environmental Precautions

The active ingredient, simazine, is non-toxic to birds, insects (bees), and aquatic invertebrates and slightly toxic to fish. Do not use this product within 10 metres of the water sources.

Toxicity

Acute oral toxicity: Practically non-toxic. Oral LD_{50} (rats) = > 5,000 mg/kg. May be irritating to eyes and cause dermatitis.

Storage

Store in dry area; heating not required.

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Priority/Spitfire/Blitz

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Priority (PCP# 30371)	ADAMA Canada	Florasulam: 50 g/L	Suspension concentrate	2 x 6.4 L
Spitfire (PCP# 31262)	FMC of Canada			
Blitz (PCP# 31687)	Loveland Products Canada Inc.			3.2 L

Crops, Staging and Rates

Rate: 40 mL/acre + .5 L glyphosate (360g. A.I/L)

Pre-seed burn down	Apply prior to planting barley, oats or wheat to control emerged labelled weeds
Summerfallow	Apply for control of labelled weeds
Fall stubble applications	Apply in the fall to control annual broadleaf weeds and grasses prior to spring seeding of wheat (including durum) barley and oats
Early post emergence*	Apply early post emergence, to the main flush of actively growing broadleaf weeds.

*In crop application with Blitz only – not mixed with glyphosate. When mixed with glyphosate, it can be used for all the above uses.

Weeds, Rates and Staging

All weeds below at 2 - 4 leaf stage.

Weed species

annual sow thistle*
cleavers
common chickweed
cow cockle
hemp nettle*
narrow leaved hawks beard*
perrenial sow thistle*
redroot pigweed*
shepherd's purse
smartweed
stinkweed
volunteer canola, including roundup ready and clearfield
wild buckwheat (1-5 leaf)
wild mustard

* Suppression. † Weeds controlled or suppressed with Priority, Blitz but not Spitfire alone

Registered Tank Mixes

Tank mix partner (both Spitfire and Priority)	Tank mix partner rate	Additional weeds controlled (see above)
glyphosate*	330 - 500 mL/acre depending on glyphosate formulation	Weeds listed on glyphosate label
Tank mix partner with Spitfire only		
Bullwhip 240 EC	93 - 117 mL/acre	Wild oats, green foxtail, yellow foxtail, tame oats, volunteer canary seed, barnyard grass. Higher rate includes Persian darnel
MCPA 500	283 mL/acre	Control: burdock, flixweed (spring rosettes), kochia, lamb's quarters, ball mustard, Russian pigweed, prickly lettuce, common ragweed. Suppression: Canada thistle, stork's bill, perennial sow thistle, annual sowthistle, dandelion
MCPA + Assert	283 mL + 648 mL/acre + adjuvent	Wheat and barley, wild oats
MCPA + Bullwhip	283 mL + 93 mL/acre or 117 mL/acre	Wheat: wild oats, green foxtail, yellow foxtail, tame oats, volunteer canaryseed, barnyard grass. Higher rate includes Persian darnel

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Tank mix partner [1] (both Spitfire and Priority)	Tank mix partner rate	Additional weeds controlled (see above)
Curtail M	637 mL/acre	Canada thistle, annual sowthistle, stork's bill, lamb's quarters, perennial sowthistle, flixweed (spring rosettes only), dandelion (suppression)
Curtail M + Assent	637 mL + 540 mL/acre	Wild oats
2,4-D 600	404 mL/acre	Weeds on 2,4-D label

[1] Blitz can be tank mixed with glyphosate present as isopropylamine or dimethylamine salts only.

Application Information

Water: Ground Equipment only. Do not apply by air. **Water Volume:** Ground application: 20 - 40 L/acre.

Mixing Instructions

Mix Priority herbicide, then add chosen glyphosate.

Application Tips

Pre-seed weed burndown/summerfallow: Priority must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Priority by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure thorough spray coverage of target weeds. Reduced control may also occur when applied to weeds heavily covered in dust.

How it Works

Priority is taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. Glyphosate is a non-selective systemic herbicide that moves through foliage into the roots, resulting in plant mortality.

Expected Results

Weeds: Weeds susceptible to Priority will stop growing immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 - 10 days after application. Annual weeds susceptible to glyphosate will wilt and yellow within 2 - 4 days. Perennials will show similar symptoms within 5 - 10 days after application.

Restrictions

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, reducing effectiveness. Do not apply if rainfall is imminent at time of application. **Grazing:** Do not graze treated areas within 7 days. **Re-cropping:** Pre-seed burn down - fields treated with Priority/glyphosate tank mix can be seeded to barley, oats or wheat in the year of application.

Toxicity

Priority Acute Oral LD_{50} (rats) => 5,000 mg/kg.

Storage

Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

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Prism SG

[redacted] Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prism (PCP# 34937)	[redacted]	Aminoxifenic (5%	Dry flowable	454 g

Use 450 gram package treats 20 acres.

Crops, Staging and Rates

Rate: 24 grams/acre plus non-ionic surfactant (1kg SunF or Agral 90) @ 2% v/v or 0.2 L/100 L of spray solution

Crop	Timing	Remarks
Potatoes (irrigated)	Apply prior to initiation of flowering	Delay cultivation for 7 - 10 days after application

Note: Because grass varieties differ in their tolerance to herbicides, limit first use of Prism herbicide to a small area of each variety prior to adoption as a best practice.

Weeds and Staging

Apply to young, actively growing broadleaf weeds before the canopy closes.

Annual grasses		Perennial grasses		Broadleaf	
Barnyard grass	1 - 6 leaf (up to early tillering - 3, 2 leaf stage)	Quackgrass (suppression)	2 - 4 leaf stage (>= 25 cm tall, leaf extended)	Canada thistle (suppression)	4 - 6 leaf stage (>= 15 cm tall or across)
Fall panicum					
Green foxtail				Redroot pigweed	
Witchgrass					
Yellow foxtail*					

*Yellow foxtail present at time of application will not be controlled. Yellow foxtail emerging after application will not be controlled.

Application Information

Ground: Apply with ground equipment. Do not apply by air. **Water Volume:** 40 L/acre.

Application Type

A rapid fluctuation in temperature (greater than 24 °C difference within 24 - 36 hours) will stress the crop. For maximum crop safety, allow 48 - 72 hours for the crop to acclimatize before spraying Prism. For maximum crop safety, apply only when the temperature in the 24 hours before and after the application ranges between 7 °C and 26 °C. Crop injury may result if application is made to potatoes that have been stressed. If potatoes have been injured by frost, wait 48 - 72 hours before applying Prism herbicide.

How It Works

Prism is absorbed through the foliage and inhibits cell elongation.

Expected Result

Prism herbicide rapidly stops growth of susceptible species; typical symptoms usually appear within 5 - 7 days, but may not be noticeable for 2 - 3 weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following application promote the activity of Prism, while cool and/or dry conditions may reduce or delay activity. Poor results may be expected if improper timing, timing, coverage or when weeds are under stress.

Restrictions

Rainfall: Rainfall within 2 - 4 hours of application may lessen degree of weed control. **Grazing Restrictions:** Do not graze the treated crops or cut for hay; sufficient data is not available to support such use. **Pre-harvest Interval:** 30 days. Make only one application per year. **Re-cropping:** Barley, soybeans, white beans, red clover, sorghum,

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Soft corn and potatoes may be planted 12 months after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.

Environmental Precautions

Pulsar herbicide is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label.

Toxicity

Ingestion: Practically non-toxic. Acute oral LD_{50} male rat > 5,000 mg/kg. Dermal irritant. Slightly toxic.

Storage

Store in a cool, dry, well-ventilated area.

Pulsar

Group 6

Formulation(s)

Product	Category	Active Ingredient	Concentration	Container Size
Pulsar (NVP# 29656)	Syngenta	Thiencarbazone-methyl Isoxaflutole Bromoxynil	4.5 g/L 90 g/L 225 g/L	1 L HDPE, Bulk

Crops, Cropping and Rates

Crop	Weeds Controlled (growth stage)	Rate
Spring and durum wheat, barley	2 - 4 leaf crop stage	Low rate: 250 mL/acre High rate: 311 mL/acre

Weeds controlled

Low rate
- cleavers — kochia up to 4 leaf stage — wild buckwheat 2 - 4 leaf

High Rate
- All of the above plus
- lamb's quarters suppression
- redroot pigweed suppression
- Russian thistle
- stork's bill suppression
- volunteer flax
- wild buchwheat up to 4 leaf

- ~~ADVISE Case 420 Tank mix 250 mL/acre~~
- all of the above PLUS
- buckhorn
- cow cockle
- flixweed
- mustards (except dog and green rocket)
- prickly lettuce
- ragweeds
- Russian pigweed
- shepherd's purse
- shinleaved
- volunteer canola

Registered Tank Mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks, additional weeds
~~ADVISE Case 420~~	barley, spring and durum wheat	250 mL/acre	Mustards, cow cockle, flixweed*, hare ear, (except dog and green rocket), prickly lettuce, ragweeds, Russian pigweed, shepherd's purse, shinleaved, volunteer canola
Assure 400	spring and durum wheat	210 mL/acre	Barnyard grass, green foxtail, Persian darnel, wild oats, cut oats, yellow foxtail, volunteer canola/rapeseed

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Herbicide trade name/number	Crops registered	Rate of herbicide trade name/number	Remarks (additional crops)
Poast®	Spring and winter canola	1.0 L/ha	Other post-emerg. weed control, storage, transfer, and use of any grass herbicide used in crop, otherwise unrestricted. Group 1 only.

[1] Do not exceed a total of 2.0 L/ha per crop per season.

Specifications Information

Water Apply with ground equipment. Do not apply by air. **Water Volume** 10 L/ha [1] Do not apply by air.

Mixing Instructions

Fill mixing instructions

Specifications Tips

Do not tank mix with any other adjuvant. Removal of wildfires to prevent other environmental or fire effect. For optimum results, apply Poast to actively growing weeds. Weed control after application of Poast may be slow when stress conditions (drought, cold) prevent weeds from growing.

Group 1 Herbicide

Poast is a systemic, post-emergence herbicide for the selective control of key annual and perennial grass weeds in crops. Poast acts on the meristematic tissue of susceptible grass species. The symptoms include discoloration, stunting, and death of the growing point. Symptoms usually appear within 1 week of application, but may take 2 to 3 weeks in cool weather. Poast is rainfast 1 hour after application.

Group 1 Herbicide

Weeds Controls grass weeds [1]. Refer to the Poast label for a complete list of controlled grass weeds. Poast is not effective on annual bluegrass, quackgrass, volunteer cereals, or wild oats. Poast is not effective on broadleaf weeds, sedges, or grasses other than those listed on the label. Poast is not effective on grass weeds under drought stress. Poast is not effective on grass weeds that have been mowed or grazed. Poast is not effective on grass weeds that have been injured by frost, hail, insects, disease, or other herbicides. Poast is not effective on grass weeds that have been planted into heavy crop residue. Poast is not effective on grass weeds that have been planted into soil that is dry and cloddy. Poast is not effective on grass weeds that have been planted into soil that is wet and muddy. Poast is not effective on grass weeds that have been planted into soil that is frozen. Poast is not effective on grass weeds that have been planted into soil that is saturated with water. Poast is not effective on grass weeds that have been planted into soil that is covered with snow. Poast is not effective on grass weeds that have been planted into soil that is covered with ice. Poast is not effective on grass weeds that have been planted into soil that is covered with frost. Poast is not effective on grass weeds that have been planted into soil that is covered with hail. Poast is not effective on grass weeds that have been planted into soil that is covered with insects. Poast is not effective on grass weeds that have been planted into soil that is covered with disease. Poast is not effective on grass weeds that have been planted into soil that is covered with other herbicides. **Restrictions** Poast should not be used in crops other than those listed on the label.

Crop Information

Crop application per crop is permitted.

Re-cropping Canola and canola-based products may be planted 1 day after application of Poast. Other crops may be planted 1 day after application of Poast. Do not plant other crops for 1 day after application of Poast. Do not plant other crops for 1 day after application of Poast. Do not plant other crops for

Pixma[100] Teagan/Pixma Advance/ Wildcat/Bengal 時尚/Corvidae/Virgil 時尚/ MP0 時尚款 Hello/Cougar

Accessories

Image, Imaging and Video

Media and Imaging

Supplemental Field Effects

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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Pursuit™ Super Pursuit Advance/Odyssey/Cadre Blue/Cadre Blue Gold (Corteva/Vigil WB/SP/DMEC) Odyssey Ultra (cont'd)

Environmental Precautions

Pursuit group (cont'd) is toxic to fish, flagfrogs, aquatic plants, terrestrial plants and some terrestrial invertebrates. Leave a 5- to 10-metre buffer zone around sensitive aquatic or terrestrial habitats.

Toxicity

Moderate acute mammalian toxicity. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

Storage

If stored for 1 year or longer, shake well before using.

Pursuit 240/MultiStar/Guardsman Gladiator/ MPower Kamikaze/Phantom 240 SL/ Nu-Image Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pursuit 240 (cont'd) (WW)	BASF Canada	imazethapyr 240 g/L	Aqueous solution	2 x 3.2 L
MultiStar 240 (cont'd) (NSS)	Loveland Products			
Guardsman Gladiator 240 (cont'd) (WW)	Nufarm			
MPower Gardsman	ITAP			
Phantom 240 SL 240 (cont'd) (WW)	ADAMA Canada			
Nu-Image Herbicide 240 (cont'd) (WW)	FMC Corp			

Note: Surfactant is not included in the package.

Use 0.5% surfactant (vol/vol) in spray.

Crops, Staging and Rates

Crop	Timing	Rate per acre
Alfalfa newly seeded and direct to forage or seed production or established for seed production	Apply after the first trifoliate leaf stage if no new stands, before the alfalfa reaches 30 cm in height for established stands.	35 mL/acre plus non-ionic surfactant such as Agral 90 or AgSurf 1.25% v/v. Non-ionic surfactant should contain at least 80% active ingredient.
Dry beans (pinto, pink, red)	Apply at the 1 - 7 leaf stage.	
Dry beans (pinto, pink, red)	Up to and including the second trifoliate leaf stage.	
Field peas	May be applied up to the sixth above-ground node stage (6 true leaves).	

Caution: Pursuit/MultiStar/Gladiator/Kamikaze/Phantom are only registered in the Black and Grey Wheated soil zones of the Prairie Provinces. Pursuit/MultiStar/Gladiator/Kamikaze/Phantom are NOT registered for use in the Brown and Dark Brown soil zones with the exception of dry beans and alfalfa (newly seeded and direct for forage or seed production) under irrigation.

Weeds and Staging

Apply early post-emergence (up to and including the 4 leaf stage) unless otherwise indicated.

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Field peas/chickling vetch: grass pea	Newly seeded pure stand alfalfa for forage or seed production	Dry beans (pinto, pink, red)
chickweed* cleavers* green foxtail hemp-nettle redroot pigweed shepherd's purse* smartweed stinkweed* volunteer canola wild buckwheat (suppression) wild mustard* wild oats (suppression)	common groundsel (suppression) green foxtail (suppression) green smartweed redroot pigweed (suppression) stinkweed* volunteer canola wild mustard*	hairy nightshade

* Excluding Group 2 resistant biotypes.

Registered Tank Mixes
No tank mixes registered.

Application Information
With: Ground equipment only. Do not apply by air. **Water Volume**: 80 - 160 L/acre.

Mixing Instructions
Use mixing instructions "a" on page 13.

Application Tips
Do not spray if temperatures of +5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing.

How It Works
Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

Expected Results
Susceptible weeds stop growing within 24 - 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 5 - 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 - 3 weeks.

Restrictions
Rainfall: Rainfall within 6 hours of application may reduce activity. **Grazing**: Alfalfa - may be grazed or harvested for forage 14 days after application. Field peas - may be fed to livestock 30 days after application. Other crops - do not graze treated crops or cut for feed prior to crop maturity. **Pre-harvest Intervals**: Field peas and chickling vetch - do not apply within 60 days of harvesting. Alfalfa - do not harvest within 14 days after application. Beans - do not harvest within 75 days after application. **Re-cropping**: Black, Grey Wooded and Irrigated Brown soil zones: Spring wheat, CLEARFIELD canola, field peas, lentils and alfalfa may be planted the season following an imazethapyr application. Barley may be planted in the Black and Grey Wooded soil zones the season following application. For other crops, call BASF at 1-877-371-2273. Perform a field bioassay on other crops prior to planting them on a field-scale. In case of crop failure, replant only to CLEARFIELD canola or field peas the year of application.

Environmental Precautions
Imazethapyr is toxic to aquatic and non-target terrestrial plants. Do not apply within 15 metres of shelterbelts, water bodies, wetlands and woodland km.

Toxicity
Oral - practically non-toxic. Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store at temperatures above 0°C. If product is exposed to temperatures below 0°C during shipment or storage, make sure the product has thawed completely and shake container vigorously.

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Pyramin

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pyramin (PCP# 15857)	BASF Canada	Pyrazon: 430 g/L	Flowable	3 L jug

Crop, Staging and Rates

Crop	Staging	Rate per acre
Sugar beet	Fall pre-plant incorporated: Apply in the fall before the ground freezes and incorporate to a depth of not more than 5 cm. Spring pre-plant incorporated: Apply on the soil and incorporate to a depth of not more than 5 cm immediately before seeding.	Heavy and medium soils: 4.14 L. Light soils*: 3.3 L. Apply in 81 - 202 L of spray solution/acre.
	Pre-emergence: Apply after seeding and before beets and weeds germinate.	Heavy and medium soils: 4.14 L. Light soils*: 3.3 L. Apply in 81 - 202 L of spray solution/acre.
	Post-emergence Apply after the first true leaf of the beet is 2.5 cm long. Do not apply when beets are in the cotyledon stage.	All soils: 3.33 L plus Citowett Plus: 250 mL/100 L of water and apply in 120 - 160 L of water per acre. Caution: Do not use Assist Oil Concentrate.

* On soils classified as sands and loamy sands, crop injury can occur if the organic matter is less than 3%.

Weeds and Staging

For post-emergent applications, weeds should not be larger than 3-true-leaf stage.

black nightshade	lamb's-quarters	ragweed	stinkweed	wormseed mustard
chickweed	oak leaf goosefoot	redroot pigweed	wild buckwheat	yellow rocket
knotweed	prostrate pigweed	shepherd's-purse	wild carrot (seedlings)	(seedlings)
lady's-thumb	purslane	smartweed	wild mustard	

Registered Tank Mixes

Tank mix partner	Pyramin + tank mix partner rate	Remarks
Nortron	Pyramin: 2.12 L/acre + Nortron: 1.48 L/acre	Apply one application per year, prior to weed emergence.

Application Information

With: Ground equipment. Do not apply by air. **Water Volume**: See above. Rates for row spacing and band width are variable. **Incorporation**: Pre-plant - incorporate shallow. Fall ridging - apply Pyramin in a 17.5 cm band and cover with a 15 - 20 cm high ridge of soil. In the spring, level the ridges and leave guide marks to enable planting the bands. Avoid levelling deeper than the chemical placement.

Application Tips

Pyramin must not be mixed into soil deeper than seed is planted to reduce beet injury.

How it Works

The active ingredient in Pyramin is absorbed by the roots and is translocated to the leaves.

Expected Results

If adequate moisture is present, the weeds will fail to emerge. If the soil is dry for a long time, weeds that emerge and become well established will not be fully controlled, but small emerged weeds may die back, once adequate moisture is present.

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Restrictions

Rainfall: No effect. **Grazing**: The tops of beets grown in Pyramin-treated soil may be used for human consumption or fed to livestock. **Re-cropping**: None.

Environmental Precautions

Do not apply Pyramin to aquatic organisms and terrestrial plants. Do not apply within 5 metres of sensitive terrestrial habitats and 1 metre of sensitive aquatic habits.

Toxicity

Oral - Low toxicity. Acute oral LD_{50} (rats) = > 2,369 mg/kg.

Storage

Store in a cool, dry place. Do not store below 0°C.

Reclaim

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reclaim A (PCP# 29751)	Dow AgroSciences	Aminopyralid: 52.5% + metsulfuron-methyl: 9.45%	Wettable granules	1.84 kg jug
Reclaim B (PCP# 29750)		2,4-D ester: 564 g/L	Emulsifiable concentrate	2 x 8 L jugs

One case treats 20 acres.

Crops, Staging and Rate

Crop	Staging	Rate per acre
Permanent grassland and pasture	Weeds sprayed may be controlled for up to 24 months. Surfactant required at 0.2% v/v.	Reclaim A: 92 g/acre Reclaim B: 800 mL/acre

On soils classified as sands and loamy sands, crop injury can occur if the organic matter is less than 3%.

Weeds Controlled and Staging

Apply when weeds are young and actively growing in the vegetative stage.

buckbrush (western snowberry)	dandelion	prairie sage	wild rose
Canada thistle	pasture sage	shrubby cinquefoil	wolf willow (silver berry)

Application Information

Water: Ground equipment: 80 L/acre, aerial: 20 L/acre.

Surfactant required at 0.2% v/v.

Mixing instructions

Fill tank to ¾ full with water; use continuous agitation; add Reclaim A. Pre-slurrying with water may be necessary where there is little or no agitation, or an injection system is being used or where herbicide is first added to a tank other than the spray tank. Add Reclaim B, then non-ionic surfactant and then an anti-foaming agent (if required) then finish filling the tank.

Application Tips

Apply in spring or early summer after weeds have fully emerged and when weeds are actively growing. Ensure that there is adequate coverage of target weeds. Drift of even small amounts of Reclaim on to sensitive plants or into areas where sensitive crops may be grown can cause injury. Do not apply under conditions prone to drift (i.e. high winds and temperature inversions).

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Reclaim (cont'd)

How it Works
Reclaim herbicide interferes with cell division causing leaf cupping, stem distortion and eventually the death of the plant. Reclaim is absorbed through the leaves and roots of the plant.

Expected Results
Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually, native grass increases in abundance as result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or as a result of environmental stress such as frost or drought.

Restrictions
Rainfall: No effect. Do not apply if rainfall is forecast for the time of application. **Grazing**: Do not allow lactating dairy animals to graze treated areas within 7 days of application. There is no restriction on livestock (except lactating dairy animals) grazing in treated areas. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application. **Cropping Restrictions**: If legumes are desired in a pasture, do not use Reclaim. Do not plant to sensitive broadleaf crops for at least 3 years after application of Reclaim.

Environmental Precautions
Runoff: Aminopyralid, one of the components in Reclaim, may move with water in very coarsely textured soils.

Toxicity
Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. Oral - low toxicity.
Acute oral LD_{50} - aminopyralid: > 2,000 ppm; metsulfuron-methyl: > 5,000 ppm; 2,4-D ester: 300 - 1,200 ppm.

Storage
Store in a cool, dry place. Do not freeze.

Refine M/BroadSide

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size*
Refine M: Refine SG (PCP# 28286)	E.I.duPont Canada	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 g
MCPA ester LV 600 (PCP# 29002)		MCPA ester: 600 g/L	Concentrate	7.6 L jugs
BroadSide: Refine SG (PCP# 28286)	Loveland Products	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 g
BroadSide: MCPA (PCP# 29002)		MCPA ester: 600 g/L	Concentrate	7.6 L jugs

* Each case contains 2 split jugs that hold 486 g of Refine SG and 7.6 L of MCPA ester. Each jug treats 40 acres.

Crops, Staging and Rates

Crop	Staging	Rate
Barley, oats, spring wheat, including durum, winter wheat	full 3 leaf to flag leaf stage	Refine SG: 12 g/acre + 190 mL/acre of MCPA ester.

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Weeds and Staging

Apply to apply to young, actively growing weeds that are less than 10 cm in height or diameter, unless otherwise indicated.

annual smartweed (green smartweed, lady's-thumb)	cow cockle	lamb's quarters	tartary buckwheat
ball mustard	dandelion	narrow-leaved hawk's beard	volunteer canola*
chickweed (1 - 6 leaf)	flixweed	redroot pigweed	volunteer sunflower
common groundsel	hemp-nettle,	Russian thistle	wild buckwheat (up to 5 leaf)
corn spurry	kochia (excluding Group 2 resistant biotypes)***	shepherd's-purse	wild mustard
		stinkweed	

Weeds suppressed

Canada thistle**	round leaved mallow (1 - 6 leaf)	sow thistle**	toadflax (< 15 cm tall)
cleavers (1 - 3 whorls)	scentless chamomile	stork's bill (2 - 6 leaf)	

* Including CLEARFIELD canola ** Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height and before crop canopy prevents thorough coverage of weeds. ***Note. A recent weed survey in Alberta shows 90% of fields have kochia resistant to Group 2 herbicides. Without testing, assume kochia in your fields are resistant and another broadleaf herbicide from another herbicide group will be needed to control kochia.

Registered Tank Mixes

Tank mix partner	Tank mix partner rate per acre	Weeds controlled
Wheat (including durum) and barley		
Axial + Adjuvant	Axial: 162 - 243 mL/acre + Adgior: 0.8 %v/v (162 mL/acre for Persian darnel only)	Broadleaf weeds controlled or suppressed by Refine M/BroadSide alone, plus wild oats, volunteer oats, green foxtail, yellow foxtail, Persian darnel, volunteer canary seed, and proso millet.
Assert/Avert	540 - 670 mL/acre	Wild oats
Fenoxaprop-p-ethyl (Puma[120] Super, WildCat, Cordon)	Fenoxaprop-p-ethyl r: 0.16 - 0.31 L (Puma Advance: 206 - 412 mL/acre)	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail, barnyard grass and yellow foxtail.
Spring wheat (including durum)		
Clodinafop propargyl (Horizon, Foothills, Signal, Ladder, NextStep, Legend) + adjuvant	Clodinafop propargyl: 93 - 115 mL/acre + adjuvant: 0.8 % v/v. ((Use 1.0% v/v at high rates. NG formulations: 376 - 474 mL/acre)	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail.
Fenoxaprop-p-ethyl (Puma Advance, Wildcat)	Fenoxaprop-p-ethyl: 93 - 115 mL/acre	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail, barnyard grass and yellow foxtail.
Everest + surfactant	Everest: 17.3 g/acre + non ionic surfactant: 0.25% v/v	All weeds controlled by Refine M/BroadSide plus wild oats, green foxtail, volunteer tame oats.

E.I.duPont supports the following mixes that are not on the Refine M label. Apply mixes according to the most restrictive use limitations for either product. Avenge, Axial BIA, Horizon NG, Traxos, Harmony Grass 240 EC, and Puma Advance.

Loveland Products will also support BroadSide with Axial Xtreme and Traxos. Apply mixes according to the most restrictive use limitations for either product.

Application Information

With: Ground and aerial equipment. **Water Volume**: Ground: 22 L/acre (minimum).

Mixing Instructions

Use mixing instructions "b" on page 13.

Application Tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine SG may be reduced if it remains in the tank for more than 24 hours.

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Refine M/BroadSide (cont'd)

How it Works
Absorbed through foliage. Refine SG inhibits cell elongation. MCPA ester is a systemic herbicide absorbed by leaf and stem and translocated to actively growing regions. It disrupts cell division causing abnormal growth.

Expected Results
Weeds: Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions
Rainfall: Rainfall within 2 hours of application may lessen degree of weed control with Refine M. **Grazing**: Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine M. Do not graze the treated crop or cut for hay within 7 days of application of Refine SG. **Re-cropping**: Canola, flax, lentils and alfalfa may be planted 2 months after application of Refine M. There are no restrictions on next crop year. Note: Do not exceed a total of 12 g/acre per crop year for the Refine SG part of Refine M.

Environmental Precautions
Refine SG is toxic to aquatic organisms and non-target terrestrial plants. For ground applications, maintain a 15 metre buffer zone between sprayed area and sensitive habitats.

Toxicity
Low acute toxicity. Thifensulfuron methyl: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg. Neither thifensulfuron methyl nor tribenuron methyl are skin or eye irritants. Tribenuron methyl: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg.

MCPA: Moderate acute toxicity. Acute oral LD_{50}(rats) = 900 - 1,400 mg/kg. Slightly irritating to the skin and severely irritating/corrosive to the eye.

Storage
Store in a cool, dry place.

Refine SG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Refine SG (PCP# 28285)	E.I.duPont Canada	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 grams

One 480 gram package treated 40 acres

Crops, Staging and Rates

Crop	Timing	Rate
Cereals: barley, oats, spring wheat, including durum, winter wheat	2 leaf to flag leaf stage	Refine SG 12 g/acre. Refine SG by itself and in certain tank mixes requires the addition of a non-ionic surfactant (Agral 90, Ag-Surf) at 2 L/1000 L of spray solution.
Seedling or established grasses for forages or seed production: meadow bromegrass smooth bromegrass creeping red fescue, tall fescue (seedling only), Kentucky bluegrass (established stand only), orchard grass, crested wheatgrass, intermediate wheatgrass, northern wheatgrass, pubescent wheatgrass, slender wheatgrass, streambank wheatgrass, tall wheatgrass, western wheatgrass	Apply post-emergence	

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Weeds and Staging

Apply to apply to young, actively growing weeds that are less than 15 cm in height or diameter, unless otherwise indicated.

annual smartweed (green smartweed, lady's thumb)	cow cockle	redroot pigweed	volunteer canola (excluding clearfield varieties)
bell mustard	flixweed	Russian thistle	volunteer sunflower
chickweed (1 - 6 leaf)	hemp-nettle,	shepherd's purse	wild buckwheat (up to 5 leaf)
common groundsel	kochia[**]	stinkweed	wild mustard
corn spurry	lamb's-quarters	tartary buckwheat	
	narrow-leaved hawk's-beard		
Weeds suppressed			
Canada thistle[*]	round leaved mallow (1 - 6 leaf)	scentless chamomile	stork's bill (2 - 6 leaf)
cleavers (1 - 3 whorls)		sow thistle[*]	toadflax (< 15 cm tall)

[*] Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height and before crop canopy prevents thorough coverage of weeds. [**] Prairie wide surveys of kochia fields have found approximately 50% of kochia populations are resistant to Group 2 herbicides. Without testing, assume kochia in your field is resistant and will not be controlled by this product alone.

Registered Tank Mixes

Tank mix partner	Tank mix partner rate per acre	Weeds controlled in addition to those controlled by Refine 50
Wheat (spring, durum, winter) and barley		
2,4-D amine or ester + surfactant	2,4-D 500: 0.24 - 0.45 L + surfactant: 0.2% of spray solution 2,4-D Ester LV 700: 0.24 - 0.32 L 2,4-D Ester LV600: 0.28 - 0.38 L	Apply when crop stage is at full 3 leaf to expanded shot blade. Burdock (seedling), cocklebur, common plantain, dandelions, ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, tumble-mustard, wild radish, wormseed mustard. (2,4-D Ester - control on stork's bill)
Spring wheat (including durum) and barley		
Assert	0.53 - 0.65 L	Wild oats.
Assert + MCPA ester	Assert: 0.53 - 0.65 L + MCPA ester 500: 0.28 - 0.45 L or Assert 0.53 - 0.65 + MCPA ester 600: 0.23 - 0.36 L/acre	Wild oats.
Axial + Adjuvant or Merge	Axial: 161 - 242 mL/acre + Adjuvant or Merge: 283 mL/acre.	Wild oats, volunteer oats, green foxtail, yellow foxtail, Persian darnel, volunteer canary seed, and proso millet.
Axial + MCPA ester 500/600 + Adjuvant or Merge	Axial: 161 - 242 mL/acre + MCPA ester 500: 0.28 - 0.45 L/acre OR MCPA ester 600: 0.19 - 0.23 L/acre + Adjuvant or Merge: 283 mL/acre.	Broadleaf weeds controlled by MCPA, plus wild oats, volunteer oats, green foxtail, yellow foxtail, Persian darnel, volunteer canary seed, and proso millet.
Banvel II + Adjuvant	Banvel II: 44.5 - 58.7 mL + surfactant: 2 L/1000 L of spray solution	Apply when crop at 2 - 5 leaf stage. kochia (note:*)ng Group 2 resistant kochia) and dandelion (spring or fall rosettes, less than 15 cm in diameter).
Fenoxaprop- p-ethyl (Puma[TM] Super, Cordon, WildCat, etc.)	Fenoxaprop-p-ethyl: 0.16 - 0.31 L/acre	Wild oats, green foxtail, barnyard grass and yellow foxtail.
Puma[TM] Super + MCPA ester	Puma[TM] Super: 0.16 - 0.31 L + MCPA ester 500: 0.23 - 0.34 L/acre OR + MCPA ester 600: 0.19 - 0.28 L/acre	MCPA susceptible weeds plus volunteer (1) IMPERIAL canola (MCPA applied at 0.34 L/acre) plus wild oats, green foxtail, barnyard grass and yellow foxtail.
Spring wheat (including durum), winter wheat, oats and barley		
MCPA amine or ester + surfactant	MCPA 500: 0.28 - 0.45 L/acre OR MCPA 600: 0.23 - 0.36 L/acre + surfactant: 0.2% of spray solution	Apply when crop stage is full 3 leaf to expanded shot blade. Burdock (seedling), cocklebur, common plantain, dandelions, ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, tumble-mustard, wild radish, wormseed mustard.

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Refine SG (cont'd)

Tank mix partner	Tank mix partner rate per acre	Weeds controlled in addition to those controlled by Refine SG
Tankmix without Confidence, Nexus and Sencor		
Attain + surfactant	Attain A: 1.33 mL + Attain B: .332 mL/acre + surfactant: 0.2% of spray solution	Cleavers (excluding Group 2 resistant cleavers)
Curtail M + surfactant	Curtail M: 400 mL/acre + surfactant: 0.2% spray solution	Canada thistle and wild buckwheat
Lontrel 360 + adjuvant	Lontrel 360: 85 mL/acre + surfactant: 0.2% spray solution	Broadleaf weeds controlled or suppressed by Refine SG alone, as well as Canada thistle (seasonal control) and wild buckwheat
Lontrel 360 + 2,4-D ester 600 + adjuvant	Lontrel 360: 85 mL + 2,4-D ester 600: 283 mL/acre + surfactant: 0.2% spray solution	All other weeds controlled by Refine SG alone, as well as Canada thistle (seasonal control), kelp 'n thumb, perennial sow thistle, shotweed, volunteer canola, wild buckwheat and wild mustard
Lontrel 360 + MCPA ester 600 + adjuvant	Refine: 12.5 grams + Lontrel 360: 85 mL + MCPA ester 600: 283 mL/acre + surfactant: 0.2% spray solution	All other weeds controlled by Refine SG alone, as well as Canada thistle (seasonal control), kelp 'n thumb, perennial sow thistle, shotweed, volunteer canola, wild buckwheat and wild mustard
Tankmix without Confidence, Nexus		
Everest + surfactant	Everest: 11.4 grams + surfactant: 0.25% v/v	Wild oats, green foxtail, volunteer terra oats
Everest + 2,4-D + surfactant	Everest: 17.2 g + 2,4-D ester 600: 283 mL/acre + surfactant: 0.25% v/v	All weeds controlled by 2,4-D plus wild oats, green foxtail, volunteer terra oats
Everest SG + Basvet 4 + surfactant	Everest: 17.2 g + Basvet 4: 45 - 59 mL/acre + surfactant: 0.25% v/v	Kochia (including Group 2 resistant kochia), green foxtail and wild oats
Tankmix without Confidence, Nexus		
Clodinafop-propargyl (Horizon 240, Novadmy 240, Fourhills 240)	Horizon: 270 - 474 mL/acre (no adjuvant needed	Wild oats, green foxtail
Simplicity + surfactant	Simplicity: 200 mL/acre + surfactant: 0.25% v/v	Barnyardgrass, cleavers, downy brome, green foxtail (suppression), Japanese brome, wild oats, yellow foxtail
Clodinafop-propargyl* + MCPA + adjuvant	Clodinafop-propargyl: 60 mL + MCPA ester 600: 282 - 371 mL/acre + adjuvant: 0.8 % v/v	MCPA susceptible weeds plus wild oats, green foxtail
Clodinafop-propargyl* + Basvet 4 + adjuvant	Clodinafop-propargyl: 60 mL + Basvet 4: 44.5 - 59.7 mL + adjuvant: 0.8 % v/v	Basvet susceptible weeds plus kochia (including Group 2 resistant kochia), wild oats, green foxtail
Fenoxaprop-p-ethyl (Bonget 400, Hyil 400)	See under Puma Super above	See under Puma® Super above
Puma	Varro: 200 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)
Puma + MCPA	Varro: 200 mL/acre + MCPA Ester 600: 230 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)
Puma + 2,4-D Ester	Varro: 200 mL/acre + 2,4-D Ester 600: 230 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)

* Clodinafop-propargyl - Products not of the HG formulation. Legend: Signal, Ladder, Whisper Aurora, Nufarm Clodinafop, Stand-fi clodinafop, Bulletop

[1] DuPont supports the following mixes that are not on the Refine SG label. Apply mixes according to the most restrictive use limitations for either product. Attain 4E, Avenge, Avoid 654, Everest 2.0, Everest 2.0 plus 2,4-D, Harmony Grass, Pulse Adjuvant, Sierra 2.0, Harmony Grass HM SG, Sierra 2.0 plus 2,4-D, Tresor.

Application information

Weeds Cleaned and aerial equipment. **Water Volume** Ground: 10 L/acre (minimum). Air: 10 L/acre.

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Mixing instructions

Use mixing instructions "B" on page 17.

Application Tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 15 cm tall at time of application. Efficient uptake of Refine SC may be reduced if it remains on the leaf for more than 24 hours. Use treated leaf tissue within 12 hours.

How it Works

Absorbed through foliage. Inhibits cell elongation.

Expected Results

Weeds: Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 – 2 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper timing, timing, coverage or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing:** Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine SC. **Re-cropping:** Do not plant any crop over 1 months after application. There are no restrictions on set-a-crop over Oats. Do not exceed a total of 17 grams per crop over the Refine SC.

Environmental Precautions

Refine SC is toxic to aquatic organisms and non-target terrestrial plants. Follow label buffer zones between application areas and sensitive habitat.

Toxicity

Low acute toxicity. Diphosphorus acid(s): Low oral toxicity. Oral LD$_{50}$ (rats) > > 5,000 mg/kg. Trifloxysulfuron-sodium: Low oral toxicity. Oral LD$_{50}$ (rats) > > 5,000 mg/kg.

Storage

Store in a cool, dry place.

Regione Ion Desiccant/Diquash Desiccant/ Regione Desiccant/Masterline Diquat/ Stage Desiccant

Formulation

Product	Container	Active Ingredient	Formulation	Restricted Use
Regione Ion (PCP# 31456)	Syngenta	Diquat 200 g/L	Solution	1L, 10 L, 20 L
Diquash Desiccant (PCP# 31456)	10 gauge Agro Engineering	Diquat 200 g/L		
Regione (PCP# 31456)	Syngenta	Diquat 200 g/L		1 L, 10 L, 20 L
Masterline Diquat (PCP# 31456)	Nufarm	Diquat 200 g/L	Solution	1 L
Stage Desiccant (PCP# 31456)	Loveland Products Canada	Diquat 200 g/L	Solution	1 L, 10 L

[redacted]

[redacted]

Note: [redacted]

Type	Rating
[redacted]	[redacted]
[redacted]*	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

*[redacted]

[redacted]

Type	Trip Condition	[redacted]		[redacted]	
		[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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		[illegible]	[illegible]	[illegible]	[illegible]
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Keys, Charging and Fobs

Key Fob	6	Fob Battery	7	Lost Key Fob

Vehicle and Charging

Type 1 charging is not available. Use a mode 3 or DC charger and the cable on your charging unit.

Section 1 - 22 kW AC

Vehicle Name	Air Filtration	Fuel Tank	Engine Bay
Engine	Air Vent	Fuel Tank Capacity	Engine
Fuel Type	Bonnet	Fuel Tank Cap	Engine Oil
Fuel Tank Capacity	Boot Capacity	Fuel Tank Cap Type	Engine Oil Capacity
Fuel Tank Cap	Boot Release	Fuel Tank Cap Type	Engine Oil Dipstick
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap

Section 2 - 22 kW AC with cable (Tethered Cable Vehicle)

Vehicle Name	Air Filtration	Fuel Tank	Engine Bay
Engine	Air Vent	Fuel Tank Capacity	Engine
Fuel Type	Bonnet	Fuel Tank Cap	Engine Oil
Fuel Tank Capacity	Boot Capacity	Fuel Tank Cap Type	Engine Oil Capacity
Fuel Tank Cap	Boot Release	Fuel Tank Cap Type	Engine Oil Dipstick
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap

Section 3 - 43 kW AC with cable (Tethered Cable Vehicle)

Vehicle Name	Air Filtration	Fuel Tank	Engine Bay
Engine	Air Vent	Fuel Tank Capacity	Engine
Fuel Type	Bonnet	Fuel Tank Cap	Engine Oil
Fuel Tank Capacity	Boot Capacity	Fuel Tank Cap Type	Engine Oil Capacity
Fuel Tank Cap	Boot Release	Fuel Tank Cap Type	Engine Oil Dipstick
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap
Fuel Tank Cap Type	Boot Seal	Fuel Tank Cap Type	Engine Oil Filler Cap

Document code: Owner's Manual - Appendix

Application Information

Note: Type 1 AC charging is not available on the Range Cellular. Use a mode 3 charger. DC fast charging is supported up to 50 kW. Use a CHAdeMO cable.

Application Tips

Type 1 charging is not available. Use a mode 3 or DC charger and the cable on your charging unit. Range Cellular supports DC fast charging up to 50 kW. Use a CHAdeMO cable. Type 1 charging is not available. Use a mode 3 or DC charger and the cable on your charging unit.

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Step 1: Mounting

Mount the unit on a flat, stable surface using the included mounting brackets and screws. Ensure adequate clearance for ventilation and cable access.

Step 2: Connecting Power

Connect the power cable to the rear panel power inlet. Use only the power cable supplied with the unit. Plug the other end into a grounded AC outlet. Do not use an extension cord or power strip.

Step 3: Connecting Inputs

Connect your audio sources to the appropriate inputs on the rear panel. Refer to the input diagram on page 12 for the location of each connector. Use balanced cables for microphone and line-level signals to minimize noise pickup.

Step 4: Connecting Outputs

Connect your speakers or amplifier to the output terminals. Observe correct polarity when connecting speaker wires. Do not exceed the maximum load impedance specified in the technical specifications.

Step 5: Initial Power-On

Turn on the unit and allow it to warm up for at least 5 minutes before adjusting any controls. The display will show the firmware version during startup.

Step 6: Configuring Network Settings

If you plan to control the unit remotely, configure the network settings using the front panel menu or the web interface. Assign a static IP address or enable DHCP as required by your network.

Specifications

Parameter	Value	Notes
Frequency Response	20 Hz – 20 kHz	±0.5 dB
Total Harmonic Distortion	< 0.01%	At rated output
Signal-to-Noise Ratio	> 110 dB	A-weighted
Input Impedance	10 kΩ	Balanced
Output Impedance	50 Ω	Balanced
Maximum Output Level	+24 dBu	Into 600 Ω load
Power Consumption	45 W	Typical
Dimensions (W × H × D)	482 × 44 × 320 mm	19" rack mount
Weight	4.2 kg	Net

Specifications subject to change without notice.

Front Panel Controls and Indicators

Control	Function	Indicator
Power Button	Turns the unit on or off	Power LED
Input Select	Selects the active input source	Input LED
Volume	Adjusts the output level	Level Meter
Menu	Opens the configuration menu	Menu LED
Enter	Confirms a selection	Enter LED

Return SG (cont'd)

Weeds Controlled

Weed Staging: Apply Return when weeds are less than 10 cm in height or in diameter, unless otherwise noted.

Broadleaved weeds controlled

tall mustard	cow cockle	narrow-leaved hawk's-beard	stinkweed
Canada thistle[1]	corn spurry	redroot pigweed	volunteer flax
chickweed (emerged only; 1 - 8 leaf)	hemp-nettle	Russian thistle	volunteer sunflowers
cleavers	kochia	shepherd's purse	wild buckwheat
common groundsel	lady's thumb	smartweed	wild mustard
	lamb's quarters	sow thistle[1]	

Broadleaved weeds suppressed

round-leaved mallow (2 - 8 leaf)	scentless chamomile	stork's bill (2 - 8 leaf)	tumbleweed

[1] Apply when chickweed is small (1 - 8 leaf) and actively growing, but before canopy prevents thorough herbicide coverage of weeds. [2] Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. [3] If the product is used without a wild oat herbicide, add a non-ionic surfactant such as Ag-Surf at a rate of .2% v/v (2 L/1000 L of spray solution).

Registered Tank Mixes

Footballs SG, WildCat, Avoit, Everest 2.0, Horizon SG, Puma[TM] Super or Puma Advance, Assure, Loveland Products will also support Return SG with Varro. Avenge (not certain wheat varieties only) and Avoid. Apply mixes according to the most restrictive use limitations for either product.

Application Information

How to Apply: Ground equipment only. Do not apply by air. **Water Volume**: Apply at 5-10 gallons/ac min. **Tank mixing order**: Check label for tank mix instructions.

If the product is used without a wild oat herbicide, add a non-ionic surfactant such as Ag-Surf at a rate of .2% v/v (2 L/1000 L of spray solution).

Mixing Instructions

Use mixing instructions "B" on page 17.

Application Tips

Effectiveness of Return may be reduced if it remains in the tank for more than 24 hrs. If Return is tank mixed with Avoit or Assure, it needs to be used within 12 hrs in order to remain effective. Application to crops that are stressed by severe weather conditions or environmental stress, disease or insect damage may result in crop injury. Under certain conditions, such as heavy rainfall, prolonged cool weather, frost or wide fluctuations in day/night temperatures, temporary lightening in crop colour and occasionally, a slight reduction in crop height may occur.

Restrictions

Rainfall: Rainfall within 4 hours of application of Return will result in reduced weed control. **Grazing**: Wheat or spring barley may not be grazed or fed to livestock or to lactating dairy animals within 7 days of application. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days prior to slaughter. **Pre-harvest Intervals**: Do not harvest the treated mature crop within 60 days after application. **Re-cropping Restrictions**: Canola, flax, lentils and alfalfa may be planted two months after an application of Return. Any crop may be planted in the year following the use of Return.

Environmental Precautions

This product contains a petroleum distillate which is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems. Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants.

Toxicity

Thifensulfuron methyl: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg. Tribenuron methyl: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg. Fluroxypyr has very low mammalian toxicology. Acute oral LD_{50} > 2,000 mg/kg. 2,4-D moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 500 - 1,200 mg/kg. 2,4-D formulations are toxic to small mammals, birds, aquatic organisms and non-target plants.

Storage

Store product in original container. If product is frozen, bring to room temperature and agitate before use.

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Reward

Group 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reward (PCP# 26271)	Syngenta	Diquat: 240 g/L	Liquid	4 x 3.78 L

Aquatic use: Weed control in still or slow moving water of farm ditches, farm dugouts, farm ponds, lakes and canals.

Weeds, Rates and Staging

Weed	Staging	Rate
Water weeds: Canada waterweed, coontail, duckweed, pondweeds, water milfoil **Algae:** *Cladophora, Spirogyra,* and *Pithophora* sp. (temporary control)	Apply only after weeds are visible and in an active stage of growth which is normally sometime in late May through June as growth is dependent on water temperatures.	For areas less than 1.5 m (5 feet) deep: 7.4 L/acre. For areas more than 1.5 m (5 feet) deep: 10 - 11.8 L/acre. Calculating area to be treated: length (m) x width (m) ÷ 10,000 m^2 x 2.47 = acres.

Application Information

How to Apply: For floating weeds, use surface application: Dilute one part Reward with at least four parts clean water and spray over water surface. Apply from the banks of small bodies of water.

For submerged weeds, inject below the water surface: A suction type of boat bailer is mounted on the cavitation plate of an outboard motor and the end of the inlet tube inserted into a solution containing one part Reward diluted with at least 10 parts of clean water (a backpack sprayer may also be used). Make lines of travel at regular intervals through the water (3 m or less apart) over the area to be treated until the whole area has received a uniform application.

Application Tips

Do not apply to muddy water and do not agitate water excessively during one or two days after treatment as the effectiveness of the chemical will be reduced. Use clean water for diluting the chemical. Do not use wetting agents or surfactants for water treatment. Repeat treatment may be necessary if weed growth reappears. Avoid application or drift onto crops or other desirable growth.

How it Works

Reward is a contact herbicide. Thorough coverage on the weeds is essential to ensure satisfactory control. Interferes with photosynthesis.

Expected Results

Control of susceptible weeds generally occurs within 1 - 2 weeks.

Restrictions

Rainfall: None. **Grazing**: Do not use treated water for at least 24 hours after treatment for swimming and animal consumption. **Fish Protection**: To protect the fish in small lakes and ponds with a dense weed growth, treat not more than 1/4 to 1/3 of the area at one time, otherwise the dying weeds over a large area will cause a serious loss of oxygen which may injure or kill the fish. **Human Consumption and Irrigation**: Do not use for at least 5 days after treatment.

Environmental Precautions

Avoid application or drift onto sensitive, non- target plants.

Toxicity

Moderate acute toxicity. Acute oral LD_{50} (rats) = 886 mg/kg. Dermal: Low acute toxicity. May cause burns upon contact with skin and eyes. Intake can cause kidney failure and liver damage.

Storage

Heated storage is required.

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Rustler/GlyKamba

Group 4, 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rustler (PCP# 27200)	Monsanto	glyphosate: 194 g/L + dicamba: 46 g/L	Water soluble liquid	10 L, 115 L, 450 L, 750 L
GlyKamba* (PCP# 30870)	NuFarm Agriculture Inc.	glyphosate: 194 g/L + dicamba: 46 g/L	Water soluble liquid	10 L, 500 L

* NuFarm will manufacture GlyKamba on a pre-order basis only.

Crops, Staging and Rates

Pre-seeding barley, corn*, oats, rye and wheat	Apply prior to crop emergence	1.0 L/acre
Chemfallow (chemical summerfallow)	Apply according to weed stage	

* For field corn, apply to medium to fine textured soils containing more than 2.5% organic matter. Do not use on sandy or sandy loam soils.

Note: Certain broadleaved crops such as lentils, peas, canola and flax can be injured by a pre-seeding application with this product and so should not be planted to a field receiving this type of treatment.

Weeds, Rates and Staging

Annual weeds Apply: 1.0 L/acre rate, any time between emergence and heading for annual grasses and when broadleaf weeds are up to 15 cm tall and actively growing		Perennial grasses Apply: 1.26 L/acre, apply before the initiation of seed head or browning of lower leaves
downy brome* green foxtail persian darnel volunteer cereals wild oats	cow cockle flixweed** kochia lamb's-quarters redroot pigweed Russian thistle smartweed (including lady's-thumb) stinkweed** volunteer canola (excluding Roundup Ready) wild mustard	foxtail barley (suppression) Use higher rate when weeds are under stress and poor growing conditions such as drought

* For best control of downy brome, Rustler/Glykamba can be applied after emergence in the fall previous to the fallow season or in spring of the fallow season up to seed head emergence. ** For best control of winter annual broadleaf weeds, such as flixweed and stinkweed, 2,4-D should be applied to emerged, actively growing weeds in the fall previous to the fallow season or in early spring in the fallow season when winter annual weeds are less than 10 cm tall.

Registered Tank Mixes

Tank mix partner	Tank mix partner rate per acre	Weeds controlled
Prior to seeding of wheat (including durum), winter wheat, barley, and rye		
2,4-D amine or ester	2,4-D: 0.2 - 0.3 L/acre	Volunteer Roundup Ready canola up to 4 leaf stage
2,4-D amine or ester	2,4-D: 0.4 - 0.5 L/acre	Volunteer Roundup Ready canola up to 6 leaf stage

Application Information

Apply with ground equipment only. Avoid galvanized steel or unlined steel (except stainless steel) spray tanks.
Water volume: 20 - 40 L/acre clean water.

Application Tips

Under certain stress conditions such as drought, cool temperatures or where extremely hard water (>700 ppm Ca + Mg) has been used, weed control may be reduced with this product. Under these conditions, lower water volume (20 L/acre) may improve results.

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How it Works
A post-emergent herbicide. Glyphosate moves from foliage into roots and kills entire plant. Dicamba disrupts cell metabolism.

Expected Results
Visual effects will usually appear within 5 - 7 days. Wilting or yellowing of weeds advances to complete browning of above ground growth and deterioration of affected underground parts.

Restrictions
Rainfall: Heavy rainfall within 2 hours may wash the chemical off the foliage and repeat treatment may be required. Rainfall within 6 hours may reduce effectiveness. **Grazing**: Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping**: Certain broadleaf crops such as lentils, peas, canola and flax can be injured by a preseeding application of Rustler/Glykamba and should not be planted in a field that has been treated with this product.

Environmental Precautions
Rustler/Glykamba are toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic habitat by leaving a 15 metre buffer zone. Non-toxic to bees and birds.

Toxicity
Glyphosate: Acute oral LD_{50} (rats) = 4,300 mg/kg; Dicamba. Acute oral LD_{50} (rats) = 2,600 mg/kg. Eye irritant.

Storage
Heated storage is required. If crystals form, place in a warm room (20°C). Roll or shake solution until crystals have redissolved.

Salute

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Salute A (PCP#31410)	Dow AgroSciences	Lontrel: 72 g/L	WDG	1 x 2.25 kg jug
Salute B (PCP#30188)	Dow AgroSciences	Imazamox: 33 g/L + imazapyr: 15 g/L	EC	1 x 8.9 L jug + 1 x 8.1 L jug Merge

40 acres/case

Crops, Staging and Rates

Crop	Staging	Rate
Clearfield tolerant canola varieties	2 - 6 leaf stage	Salute A: 56 g/acre plus Salute B: 245 mL/acre plus Merge: 0.5% v/v

Weeds and Staging
Annual Grasses from 2 to 6 - true leaf stage and 2 tillers

Weeds

barnyard grass
green foxtail
Persian darnel
spring germinating Japanese brome grass
volunteer barley
volunteer canary seed
volunteer durum wheat
volunteer spring wheat (non-imazamox tolerant)
volunteer tame oats
wild oats
yellow foxtail

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Salute (cont'd)

Broadleaf weeds from 2 to 4 leaf stage

Weeds

- annual sow thistle[1]
- Canada thistle[1]
- cleavers
- cow cockle
- green smartweed
- hemp-nettle
- lamb's-quarters
- perennial sow thistle[1]
- redroot pigweed
- round-leaved mallow
- Russian thistle
- shepherd's purse
- stinkweed
- volunteer canola (non-Clearfield canola varieties only)
- wild buckwheat
- wild mustard
- volunteer tame mustard

[1] Top growth control

Application Information

How to Apply: By ground ONLY. **Water volume**: 40 L per acre.

Application Tips

Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

How it Works

Salute A herbicide is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Salute B herbicide is absorbed by foliage and roots and disrupts plant metabolism, causing growth to stop. Maximum efficacy results from foliar application to young, actively growing plants.

Expected Results

Plants susceptible to Salute A may exhibit symptoms including swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour from dark green to yellow to brown as they die. Death of plants may occur in 14 - 21 days after application. Plants susceptible to Salute B may stop growing within 24 - 48 hours. Yellowed growing points, yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 - 10 days, starting with the youngest and moving to the older leaves. Death of plant may occur in 1 to 3 weeks.

Restrictions

Rainfast: Within 3 hours of application. **Pre-harvest Intervals**: DO NOT apply within 60 days of harvesting CLEARFIELD canola. **Re-cropping**: The year following Salute application fields can be seeded to: canary seed, field pea*, field corn, CLEARFIELD canola and Juncea, spring wheat, barley, oats. Two years following Salute application, fields can be seeded to: canola (all types), flax, sunflower, durum wheat, lentils, chick pea. *DO NOT seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (22 months following application), contact your local Dow AgroSciences representative or retailer for more information before seeding field peas following drought conditions in the previous year.

Environmental Precautions

Avoid contamination of or drift towards non-target land, water or irrigation ditches. Leave at least 11 m between the downwind edge of the boom and sensitive areas.

Toxicity

Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in dry, heated area. DO NOT freeze.

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Select/Centurion/Arrow 240 EC/ Shadow RTM

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Select (PCP# 22625) Amigo (PCP# 22644)	Arysta LifeScience	Clethodim: 240 g/L	Emulsifiable concentrate	3 L
		Surfactant: 30%		9 L
Centurion (PCP# 27598) + Amigo (PCP# 22644),	Bayer CropScience	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Arrow 240 EC (PCP# 28224) + X-Act (PCP# 28225)	ADAMA Canada	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Shadow RTM (PCP# 29277) + Amigo (PCP# 22644)	Loveland Products	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L

Crops, Staging and Rate

Crops are tolerant at all growth stages with the exception of chickpeas, fenugreek, prairie carnation and coriander, although maximum rates and Pre-harvest Interval must be observed to prevent excess residues in the grain

Maximum Application Rate: Chickpeas and dry beans and prairie carnation - 76 mL/acre
All other crops listed below - 152 mL/acre

alfalfa (seedling)
canola
caraway*
carrot
chickpeas (desi and kabuli before 9 nodes)
coriander* (2 - 5 leaf)
dill* (3 - 5 leaf)
dry common beans* (*Phaseolus vulgaris*)
dry onions (1 - 4 leaf)
fenugreek(3 - 5 leaf)*†
field peas
flax
lentils mustard (oriental, brown)
mustard
parsnip
potatoes
prairie carnation (2 - 5 leaf)*†
radish
red garden beets
safflower†
soybeans
spinach*†
sunflowers

* One application per year.

† Select and Centurion only

Note: Dry common bean varieties may vary in their tolerance to clethodim (Arrow/Centuron/Slect/ Shadow). Since not all dry common been varieties have been tested for tolerance to clethodim, first use of clethodim should be limited to a small area of each variety to confirm tolerance prior to adoption as a general field practice. Additionally, consult your seed supplier for information on the tolerance of specific varieties of dry common beans to clethodim.

Weeds, Rates and Staging

Weed species	Leaf stage	Rate per acre	Rate of Amigo or X-ACT
Green foxtail, volunteer cereals, wild oats, yellow foxtail	2 - 4 leaf	50 mL	0.5% v/v
Barnyard grass, fall panicum, proso millet, volunteer canary grass, volunteer corn, witch grass	2 - 6 leaf		
Barnyard grass, crabgrass, fall panicum, green foxtail, Persian darnel, proso millet, volunteer canary grass, volunteer cereals, wild oats, witch grass, yellow foxtail	2 - 6 leaf	76 mL	0.5% v/v.
Quackgrass (suppression only*)	2 - 6 leaf	76 mL	
Quackgrass control (season-long)	2 - 6 leaf	152 mL	1.0 % v/v

* For quackgrass suppression. Most effective results are achieved when application is made at the 3 to 5 leaf stage, when the canopy is uniform and actively growing.

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Select/Centurion/Arrow 240 EC/Shadow RTM (cont'd)

Registered Tank Mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Flax (including Solin)		
Buctril M/Badge II	Clethodim: 76 - 152 mL/acre + Buctril M: 400 mL/acre + Amigo: 0.5% v/v OR Badge II: 500 mL/acre + X-Act: 0.5% v/v.	Clethodim susceptible weeds plus certain seedling broadleaf weeds. Note: Do not apply this tank mix in hot, humid weather when temperatures are over 25 - 29°C.
Badge (only with Arrow 240)	Clethodim: 76 - 152 mL/acre + Badge: 500 mL/acre + X-Act: 0.5 % v/v.	
Curtail M	Clethodim: 76 mL/acre + Curtail M: 600 - 800 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild buckwheat and Canada thistle.
Lontrel 360	Clethodim: 76 mL/acre + Lontrel 360: 230 - 340 mL/acre + Amigo: 0.5 % v/v.	
MCPA* (not Solin varieties)	Clethodim: 76 - 152 mL/acre + MCPA ester 600: 340 mL + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus certain seedling broadleaf weeds.
Canola		
Lontrel	Clethodim: 76 mL/acre + Lontrel 360: 169 - 335 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild buckwheat and Canada thistle.
Muster	Clethodim: 76 mL/acre + Muster: 8 - 12 g/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild mustard, stinkweed, green smartweed and redroot pigweed.
CLEARFIELD canola		
Pursuit	Clethodim: 76 mL/acre + Pursuit: 40 - 85 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus chickweed, hemp nettle, red root pigweed, stinkweed, volunteer canola (except CLEARFIELD), wild buckwheat, wild mustard.
Field peas		
Pursuit	Clethodim: 76 mL/acre + Pursuit: 85 mL/acre + Amigo: 0.5 % v/v.	
Liberty Link canola		
Liberty 150 SN	Clethodim: 25 - 50 mL/acre + Liberty: 1.35 - 1.60 L/acre + Amigo: 0.5 % v/v.	Wild oat, volunteer barley, volunteer wheat, volunteer oat plus Liberty susceptible weeds.

* Flax may be treated from 5 cm tall to just before the bud stage.

Bayer CropScience also supports the following mixes that are not on the Centurion label. Centurion with Odyssey in field pea, alfalfa, CLEARFIELD cereals and CLEARFIELD lentils, Headline in chickpeas, dry beans , lentil and field pea, Proline with chickpea and lentil, Quadris or Quilt in chickpea, dry beans, lentil and field pea, Decis and Sevin XLR. Loveland Products support the same unregistered tank mixes with Shadow RTM. Apply mixes according to the most restrictive use limitations for either product.

Application Information

With: Apply with ground equipment. Some crops are registered for use by air. Check label. **Water Volume**: Ground application: 22 - 91 L/acre maximum.

Mixing Instructions

Use mixing instructions "c" on page 13.

Application Tips

The use of 80° stainless steel flat fan nozzles tilted 45° forward is recommended for optimum spray coverage. Use high water volumes on dense crop canopies for better penetration to weeds. Best results will occur if applications are made to weeds not stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Select/Centurion/Arrow/Shadow at 51 mL/acre should only be applied under the following conditions: good crop stand, early application (prior to tillering), light to moderate weed infestation, adequate moisture and fertility, absence of stress, good growing conditions.

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How it Works

Select/Centurion/Arrow/Shadow are systemic herbicides that are translocated from the treated foliage to the growing points of leaves, shoots and roots.

Expected Results

Weeds: Leaf foliage will first change from green to yellowish, then purplish and finally a brown colour.

The time required for complete control is 7 - 21 days following treatment, depending on growing conditions and crop competition.

Restrictions

Rainfall: Rainfall within one hour of application may reduce the effectiveness of the spray. **Grazing**: Do not cut treated crops for feed or graze until 60 days after application of clethodim to annual crops and 30 days after application to seedling alfalfa. **Pre-harvest Interval:** Canola, coriander, common dry beans, canewax, chickpeas (desi, Kabuli), flax (including Safire), lentils, potatoes, and mustard (brown, yellow oriental): 60 days. Alfalfa, cumin, fenugreek, radish, red garden beet and parsnip: 30 days. Dill: 40 days Sunflower: 72 days. Field peas: 75 days.

Environmental Precautions

Clethodim is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Toxicity

Low oral toxicity. Acute oral LD_{50} (male rats) = 2,930 mg/kg.

Storage

Does not require heated storage.

Sencor Solupak 75 DF

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sencor Solupak 75 (PCP# 30960) **Sencor 75 DF (PCP# 17592)**	Bayer CropScience	Metribuzin: 75%	Water dispersible granules	2.5 kg bags

Crops, Staging and Rates

Crop	Staging	Rate per acre
		Sencor Solupak
Barley	2 - 5 leaf stage	81 - 162 g
Spring wheat (including durum)	2 - 5 leaf stage	81 - 162 g
Winter wheat	In the late fall after tillers have developed	226 - 304 g
Field peas	Post-emergence. Up to 15 cm of vine length (single application)	113 - 152 g
	Post-emergence (split application*)	56 - 77 g
	Pre-plant incorporated when tank mixed with Treflan or Edge	See tank mixes section
Chickpeas	Up to 8 cm in height	113 g
Lentils	Post-emergence. Up to 15 cm of vine length	113 g
Soybeans	Pre-plant incorporated, when tank mixed with Treflan	
Fababeans	Pre-plant incorporated when tank mixed with Treflan EC or Edge	See Tank Mixes section

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Sonance Softgrab 75 DF (cont'd)

Crop	Staging	Rate per acre
		Sonance Softgrab
Potatoes	Pre-plant incorporated with Sonan	[illegible] g
	Pre-emergence irrigation with Sonan	[illegible] g
	Early post-emergence, 2g w. 1% oil	[illegible] g
Alfalfa grown under irrigation (Sonance 480 only)	In the fall to dormant established stands. Injury may occur to alfalfa if Sonance 480 is applied earlier than 10 months after seeding	Not registered
Shelterbelts	Pre-plant incorporated - spring. When tank mixed with Treflan EC	Sonance [illegible] g + Treflan [illegible] L

[illegible] Post application followed by second application, [illegible] 10 days later in the same stage

Weeds, Rates and Staging

Post-emergence Applications

Barley, wheat (excluding durum): apply Sonance Softgrab 75 DF at a rate of [illegible] grams

chickweed	hemp-nettle (suppressed)	lamb's-quarter	shepherd's-purse
green smartweed	kelly's thumb	redroot pigweed	volunteer canola

Barley, wheat (excluding durum): apply Sonance Softgrab 75 DF at a rate of [illegible] - 102 grams; all the above weeds plus control of:

ball mustard	hemp-nettle	right-flowering catchfly	tansy mustard
common groundsel	tartar	Russian thistle	wormseed mustard
corn spurry			

Wheat, wheat (Sonance only): apply Sonance Softgrab 75 DF at a rate of [illegible] - 300 grams

downy brome	flixweed	shepherd's-purse	stinkweed

Chickpeas, lentils (suppression only) - apply Sonance Softgrab 75 DF at a rate of [illegible] grams

ball mustard	corn spurry	hemp-nettle	stinkweed
common chickweed	green smartweed	lamb's-quarters	tansy mustard

Field peas: apply Sonance Softgrab 75 DF at a rate of [illegible] - [illegible] grams

ball mustard	corn spurry	hemp-nettle	stinkweed
common chickweed	green smartweed	lamb's-quarters	tansy mustard

Alfalfa (irrigation) - apply Sonance Softgrab 75 DF at a rate of [illegible] grams

annual sow thistle	green foxtail	prickly sage	shepherd's-purse
downy brome	kochia	redroot pigweed	stinkweed
flixweed	lamb's-quarters	Russian thistle	wild oats

Potatoes (irrigated): apply Sonance Softgrab 75 DF at a rate of [illegible] grams

Do not use post-emergence on varieties Atlantic, Dormance, red-skinned or very early maturing varieties.

ball mustard	green smartweed	lamb's-quarter	Russian thistle
common chickweed	hemp-nettle	right-flowering catchfly	stinkweed
common groundsel	tartar	redroot pigweed	tansy mustard
corn spurry	kelly's thumb		Russian thistle

Pre-plant Incorporated Applications

When be applied as a tank mix with Treflan EC or Rival - check tank mix label for additional weeds and rates.

Registered Tank Mixes - Post-emergence

Tank mix partner	Staging	Sonance Softgrab 75 DF	Tank mix/less partner rate
Barley, barley (check for Sonance), wheat, wheat (Sonance only)			
2,4-D amine	3 - 5 leaf	[illegible] g	[illegible] mL
Basagran	2 - 3 leaf	[illegible] g	[illegible] mL
MCPA	3 - 5 leaf	[illegible] g	[illegible] mL
Target	2 - 3 leaf	[illegible] g	[illegible] mL
Field peas, post-emergence			
MCPA (No-till)	Peas 10 cm long	[illegible] g	[illegible] mL

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Soil w/o protect	Rotary	Xonaxx Outgrub PO-DF	Soil w/o protect cont. use
Preemergence			
Prior to Adjuvant		[illegible]	[illegible]

Soil w/o protect	Xonaxx Outgrub PO-DF	Soil w/o protect cat. per acre
Preemergence (Pre-plant Incorporated)		
Tomato	[illegible]	[illegible]
Preemergence (Pre-plant Incorporated)		
Tomato	[illegible]	[illegible]

Application Information

Mode Apply with ground sprayer. **Water Volume** Pre-emergence: Barley, wheat, 40 L/acre. Fallow/pre, lentils, peas, 70 L/acre. Pre-plant incorporated (PPI) peas, lentils, faba beans, 40 L/acre. Potatoes, 80 - 120 L. Note: In general, higher rates of water increase crop coverage.

Mixing Instructions

Use mixing instructions 'a' on page 21

Incompatibilities

Do not mix or use organic wetter/acidic when applying Xonaxx other clean or with a soil incorporated mix with other herbicides. Special conditions may apply.

Soil Irrigation

Xonaxx + Cyanic Fixation: pre-emergence or sprinkler irrigation. Apply specified dosage in 1 - 6 mm (5 mm) water and use a continuous injection to sprinkler prior to sowing, or to the last 10 - 15 minutes of use in combination with an sprinkler a dose of soil geografical wheat sowing systems. On sandy soil, apply at 1 - 2 mm of water and use the lower rate of Xonaxx and Cyanic. Apply pre-emergence to crop and weeds. Use the higher rate for control of grassy weeds or where broadleaf weeds are dense.

Application Tips

Allow 3 - 7 days between application of Xonaxx and post-emergent contact herbicides. Allow 3 - 7 days after frost for crop to recover before applying Xonaxx. Poorly drained may be reduced if applied later than the 3 leaf stage of crop. Crop may be sprayed when wet with dew. Where recommended, crop must be planted at least 5 cm below soil surface. Overlap applications or segregate incorporation of soil could to create weed control or crop injury, depending on rate used.

Stress conditions such as seedling disease, cold weather, deep planting, excessive moisture, thick soil overcondition, or drought may weaken seedlings and increase the possibility of crop damage from the herbicides. Temporary lightening to yellow may occur on the margins of leaves or cotyledons and a slight delay in crop development may be observed. This is specific responses and usually has no lasting effect.

Grow & Shorts

It is severe herbicide absorbed by leaves and roots and translocated to new growth. Inhibits photosynthesis and the weed turns brown and dies.

Expected Results

Broadleaf weeds Varied following 1 - 7 days after application, weeds are brown and die within 10 - 15 days. Action is not for a short period and can control new shallow weed germinants like chickweed.

Crops In cotyledon, the weather or when from severe within 1 - 2 days of application, crop will show weak yellowing and slight reduction in height. Possibly action disappears in 7 - 10 days. On Crucifer, tolerance, 10 Leucoidin and Lodge barley varieties, temporary lightening to yellow and reduction in height may occur. Lentils and peas provide little competition against weed growth due to their low growth habit. Under heavy weed infestations or bulk growth, control may be poor.

Field peas and lentils Stressful conditions increase the possibility of damage. Temporary lightening to the margins of cotyledons and a slight delay in development may occur. Canola: 1 - 2 days. **Water Volume** to avoid to reduce crop injury.

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Restrictions

[illegible]

Environmental Precautions

[illegible]

Toxicity

[illegible]

Storage

[illegible]

Simplicity/Simplicity GoDRI

[illegible]

Formulation

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Crops, Staging and Rates

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

Division and Weighing

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
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Registered Trade Offices

[illegible]

[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]

Applications Information

ABS is a rigid, tough, amorphous engineering thermoplastic with good impact strength, dimensional stability, and ease of processing. It is widely used in consumer electronics housings, automotive interior components, and recreational equipment. ABS can be blended with polycarbonate (PC) to improve heat resistance and impact performance, and is commonly used in 3D printing (FDM/FFF) applications.

Machining Recommendations

Cut with sharp tools at moderate speeds. Avoid excessive heat buildup, which can cause melting and poor surface finish. Use coolant or compressed air to dissipate heat during machining operations.

Typical Properties (Typ)

Property	Value	Test Method
Density	1.04 g/cm³	ASTM D792
Tensile Strength at Yield	40 MPa	ASTM D638
Elongation at Break	30 %	ASTM D638
Flexural Modulus	2.3 GPa	ASTM D790
Notched Izod Impact (23 °C)	200 J/m	ASTM D256
Heat Deflection Temperature (0.45 MPa)	98 °C	ASTM D648
Vicat Softening Temperature (B/50)	102 °C	ASTM D1525
Coefficient of Linear Thermal Expansion	90 µm/m·°C	ASTM D696
Water Absorption (24 h)	0.2 %	ASTM D570

Max. Continuous Service Temperature

Suitable for continuous use at temperatures up to approximately 80 °C in air. Short-term exposure to 95 °C is acceptable. Above 80 °C, dimensional changes and loss of mechanical properties may occur. Not recommended for applications requiring long-term exposure above this limit.

Resistance to Chemicals

Resistant to dilute acids, alkalis, and aqueous salt solutions. Swells and dissolves in ketones, esters, and chlorinated hydrocarbons. Limited resistance to aromatic hydrocarbons and gasoline. Stress cracking may occur in contact with certain alcohols and oils under load.

Resistance to Sunlight

Exposure to UV radiation causes yellowing and surface degradation. Outdoor use requires UV-stabilized grades or protective coatings. Not recommended for long-term outdoor exposure without additives.

Environmental Precautions

Dispose of scrap in accordance with local regulations. Recycling is possible; ABS is identified by resin code 7 (Other). Avoid incineration of large quantities due to the release of hydrogen cyanide and styrene vapors.

Flammability

Burns with a sooty, yellow flame. Self-extinguishing grades are available (UL 94 V-2 or V-0 at 1.5 mm). Ignition temperature: approx. 400 °C.

Storage

Store in a dry, cool place away from direct sunlight. Moisture absorption can affect processing quality; dry material at 80 °C for 2–4 hours before use if stored in humid conditions. Shelf life: 24 months in sealed original packaging.

Grades

Grade	Color	Notes
ABS-GP	Natural	General purpose, good balance of properties
ABS-HI	Natural	High impact, suitable for thin-wall parts
ABS-FR	Black	Flame retardant, UL 94 V-0 at 1.5 mm
ABS-UV	Gray	UV-stabilized for outdoor use

Recommendations:

Grade	Recommendation	Color	Notes
ABS-GP	Recommended	Natural	Standard grade for most applications
ABS-HI	Recommended	Natural	Preferred for impact-critical parts
ABS-FR	Conditional	Black	Limited availability; lead time 4 weeks
ABS-UV	Not recommended	Gray	Discontinued; use ASA instead

Max. heat exposure: 80 °C continuous

[redacted]

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Soils (cont'd)

Expected Results

Susceptible weeds stop growing within 24 – 48 hours. Yellow, stripping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 – 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 – 3 weeks.

Restrictions

Rainfall: Do not spray if there is a forecast of rain during or soon after application as the rain may reduce control. **Cropping:** Do not graze treated crop or cut for feed within 20 days of application. Do not graze treated sunflower plants or cut for straw; sufficient data are not available to support such use. **Pre-harvest Interval:** Do not harvest the treated crop within 60 days of application. **Re-cropping:** Winter wheat may be seeded 3 months after application. Barley, canaryseed, all types of canola, chickpeas, CLEARFIELD lentils, field corn, sunflowers (including CLEARFIELD varieties), field peas, flax, lentils, oat, spring wheat (including durum) may be seeded the first spring after application. Cauliflower mustard can be seeded 2 years after treatment. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on cropping intervals.

Environmental Precautions

Solo is highly toxic to aquatic plants and non-target terrestrial plants. Leave at least 1 metre buffer strip between the point of application and sensitive aquatic and terrestrial habitats.

Toxicity

Low acute oral toxicity. Acute oral LD_{50} (rats) > 5,000 mg/kg. Non-toxic to fish, birds and bees.

Storage

Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all times.

Spectrum

Group 2, 4

Formulation

Each case of Spectrum contains two components: Spectrum A and Spectrum B

Product	Company	Active ingredient	Formulation	Container size
Spectrum A (PCP# 33605)	Dow AgroSciences	Florasulam: 50 g/L	Suspension	0.8 L
Spectrum B (PCP# 33606)		Clopyralid: 50 g/L + MCPA ester: 280 g/L	E.E.	12 L

Crops, Staging and Rates

Crop	Staging	Rate
Barley, oats	2 – 6 leaf	Spectrum A: 40 mL/acre Spectrum B: 600 mL/acre
Spring wheat (including durum)		
Forage grasses (seedling and established for seed production): fescue (chewing, creeping red, hard), wheat grass (crested and intermediate, tall), bromegrass (smooth, meadow and hybrid), perennial rye grass, timothy	As soon after 2 leaf stage.	

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Weeds and Staging

Annual broadleaf weeds: Apply at 1 - 4 leaf stage, unless otherwise stated.

Canada thistle and perennial sow thistle: Apply after all thistles have emerged and when the majority are in the rosette to pre-bud stage.

annual sow thistle	flaxweed (spring seedlings only)	smartweed
Canada thistle	hemp-nettle	stinkweed
chickweed	lamb's-quarters	stork's-bill
cleavers	perennial sow thistle (top growth control)	volunteer canola (all varieties)
dandelions (spring seedlings and over-wintered 15 cm)*	redroot pigweed	wild mustard
	shepherd's purse	wild buckwheat

* Suppresses dandelions greater than 15 cm across and mature plants

Registered Tank Mixes

Tank mix partner	Tank mix rate	Adjuvant	Additional weeds controlled
Barley, spring wheat (including durum)			
Assert 300 SC	647 mL/acre	Acidulate: 2.5 kg/10.8 L of Assert	Wild oat.
Barley and spring wheat (excluding durum)			
Axial 100 EC + Adigor	243 mL/acre	Adigor: 283 mL/acre	Wild oats and green foxtail.
Spring wheat (including durum)			
Everest	17.4 g/acre	Ag Surf or Agral 90: 0.25 % v/v	Barnyard grass, green foxtail, yellow foxtail, proso millet, volunteer canary seed, wild oats.
Simplicity/Simplicity GoDRI	Simplicity: 200 mL/acre Simplicity GoDRI: 28 g/acre	None required	Grass and broadleaf weeds consult label.

Application Information

How to Apply: Apply with ground equipment only. Do not apply by air. **Water Volume**: 40 L/acre.

Mixing Instructions

Use mixing instructions "b" on page 13. Add A first, then B.

Application Tips

Do not apply to crops underseeded to legumes. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds.

How it Works

Spectrum tank mix is a combination of Group 2 and Group 4 herbicides. Group 2 herbicides inhibit the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids that are essential for plant growth. Group 4 herbicides are synthetic auxins, which act at multiple sites in the plant to disrupt hormone balance and protein synthesis and thereby cause a variety of plant growth abnormalities.

Expected Results

The weeds susceptible to florasulam will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red coloration may not be noticeable for 1 - 2 weeks. Twisting of stems may also be observed on weeds sensitive to Curtail M. Warm, moist conditions, small weed size and a competitive crop will optimize weed control provided by Spectrum.

Restrictions:

Rainfall: Do not apply if rainfall is expected within 6 hours. **Grazing**: Do not permit any **Grazing** within 7 days after application. Do not harvest forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Intervals**: Do not harvest the treated crop within 60 days after application. **Re-cropping**: Fields previously treated with Spectrum herbicide can be seeded the following year to barley, canola, field peas, oats, or wheat, corn, flax, and mustard (brown, oriental, and yellow) or fields can

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Spectrum (cont'd)

be summerfallowed. Seed only those crops listed above in the year following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application, delay seeding field peas an additional 12 months (total 22 months following application).

Environmental Precautions

Spectrum A is highly toxic to aquatic organisms on an acute basis. It is slightly toxic to birds. A buffer zone of 30 metres is required between the application area and sensitive areas.

Toxicity

Spectrum A has extremely low acute toxicity. Acute LD_{50} = > 5,000 mg/kg. Spectrum B (Clopyralid and MCPA) has low acute toxicity. Acute LD_{50} rats = > 2,000 mg/kg. MCPA has moderate acute toxicity. Acute LD_{50} of technical = (700 - 800 mg/kg).

Storage

Store in a dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

Stellar/Outshine

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Stellar A (PCP# 29286)	Dow AgroSciences	Florasulam: 2.5 g/L + fluroxypyr: 100 g/L	SC	2 X 8.0 L
Stellar B (PCP# 29165)	Dow AgroSciences	MCPA ester: 600 g/L	EC	9.33
Outshine (PCP# 31646)	ADAMA Canada	Florasulam: 2.5 g/L + fluroxypyr: 100 g/L	SC	2 x 8.0 L

Treat 40 acres per case of Stellar.

Crops, Staging and Rates

Crop	Staging	Rate
spring and durum wheat, barley, oats	2 leaf to expanded 6 leaf	Stellar A: 400 mL/acre + Stellar B: 240 mL/acre

Weeds, Rates and Staging

Weed stage: Apply when weeds are actively growing (2 - 4 leaf stage). Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds. Follow all precautions, directions for use, and limitations on the tank mix partner labels.

Weeds Controlled

- burdock
- chickweed[2]
- cleavers (1 - 8 whorl)[2]
- cocklebur
- flixweed
- hemp nettle[1]
- kochia[1,2]
- lamb's-quarters
- plantain
- prickly lettuce
- ragweed
- red root pigweed
- Russian pigweed
- shepherd's purse
- stinkweed
- sunflower(annual
- vetch
- volunteer canola
- volunteer flax[2]
- wild buckwheat[2]
- wild mustard
- wild radish

[1] Includes ALS resistant biotypes. [2] Also controlled by Outshine.

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Registered Tank Mixes

Tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks (adjuvant rate, crop staging and any other restrictions)
Assert 300 SC	Spring wheat, durum wheat and spring barley	640 mL/acre	Refer to Assert label for mixing instructions.
Axial 100 EC	Spring wheat and spring barley	240 mL/acre + Adigor: 280 mL/acre	See label for mixing instructions for control of wild oats, green and yellow foxtail, barnyard grass.
Everest 2.0	Spring wheat and durum wheat	19 - 29 mL/acre + non-ionic surfactant at 0.25% v/v	See label for mixing instructions for control of wild oats and green foxtail.
Simplicity/Simplicity GoDRI	Spring wheat and durum wheat	Simplicity: 200 mL/acre/ Simplicity GoDRI: 28 g/acre – no surfactant required for either formulation.	150 ml/acre or 21 gram rates of Simplicity to control lighter infestations of wild oats.

Simplicity is a supported tank mix partner based in accordance with PMRA tank mix guidelines. Simplicity on all wheats at 200 mL/acre for control of barnyard grass, Japanese brome, yellow foxtail, wild oats, and suppression of downy brome and green foxtail. 150 mL/acre controls wild oats only.

Outshine is registered for the same three products as Stellar as well as 2,4-D Ester 700 and MCPA Ester 600. Outshine is also registered for mixes with 2,4-D Ester and MCPA Ester. Check label for mixing partner amounts.

Application Information

Water Volume: Ground equipment only (40 L/acre).

Mixing Instructions

Half fill sprayer with water and agitate. Add Stellar A, then B, then any tank mix partner.

How it Works

Stellar/Outshine is readily absorbed by weed foliage. The florasulam component inhibits the ALS enzyme in plants resulting in a rapid halt in plant growth followed by yellowing, most noticeable after 1-2 weeks. The fluroxpyr and MCPA components mimic plant growth regulators causing swelling and thickening and twisted weed growth followed by yellowing and browning, resulting in plant mortality.

Expected Results

Weeds start to discolour and twist shortly after application. Plant growth will cease or become erratic followed by browning and plant mortality.

Restrictions

Rainfall: Do not apply if rainfall is expected within 2 hours of application. **Re-cropping**: Fields previously treated with Stellar/Outshine can be seeded the following year to barley, canola, oats, peas, or wheat or fields can be summerfallowed. **Grazing**: Do not cut the treated crop for hay or graze treated crop within 7 days after application. **Pre-harvest Intervals**: Do not harvest the treated crop within 60 days after application. **Leaching**: This product has potential to leach. Do not apply excessive irrigation. **Buffer Zone**: Use a buffer zone of 30 metres between area applied and sensitive terrestrial and aquatic habitats.

Toxicity

For Stellar A/Outshine, the oral LD_{50} for rats is > 2,000 mg/kg (males). Stellar B/MCPA ester has moderate acute toxicity. LD_{50} of technical = 700 - 800 mg/kg.

Storage

Store in original containers in a secure, dry heated storage. If product is frozen, bring to room temperature and agitate before use.

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Tandem

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tandem A (PCP#29985)	Dow AgroSciences	Pyroxsulam: 30 g/L	Oil dispersion	1 x 8 L
Tandem B (PCP#29965)		Fluroxypyr: 333 gae/L	E.C.	1 X 4.84

One case treats between 40-53 acres

Crops, Staging and Rates

Crop	Staging	Rate
Spring, winter and durum wheat	Apply to actively growing wheat from the 3-leaf stage to the first node stage.	Low rate: Tandem A 150 mL/acre rate + Tandem B: 85 ml/acre rate in spring and durum wheat High rate: Tandem A: 200 mL/acre rate + Tandem B: 125 ml/acre rate

Note: Occasionally slight yellowing or height reduction may be observed in the treated crop. These transient symptoms disappear within 14 days with no reduction to yield. Do not apply to crops suffering from drought, nutrient deficiency or exposed to frost or other agronomic factors affecting plant growth

Weeds Controlled and Staging

High Rate

barnyard grass (1 - 5 leaf stage)
common chickweed** (up to 10 cm)
cow cockle (up to 8 leaf)
cleavers (up to 8 whorls)
dandelion*
downy brome (1 - 6 leaf) suppression
flixweed (up to 10 cm)
green foxtail* (1 - 5 leaf)
hemp-nettle** (1- 8 leaf)
lady's-thumb (1 - 5 leaf)
Japanese brome (1 - 6 leaf)
kochia**
red root pigweed (1 - 8 leaf)
stork's bill*
wild buckwheat* (1 - 4 leaf)
wild oats (up to 4 leaf, 2 tillers)
volunteer canola (excluding CLEARFIELD)
volunteer flax (1 - 12 cm)
yellow foxtail (1 - 5 leaf)

* Suppression

** Includes biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme

Low Rate

wild oats (up to 4 leaf, 2 tillers)
cleavers (1 - 6 whorls)

Tandem A Rate: 150 mL per acre. Tandem B Rate: 84 mL/acre with conditions of low wild oat populations < 75 wild oats/m²

Registered Tank Mixes

Tank mix partner with Tandem	Tank mix partner rate	Additional weeds controlled
2,4-D ester	Up to 241 ml/acre LV ester 700	Susceptible weeds such as bluebur, burdock, cocklebur, goat's beard, lamb's quarters, mustards (except dog and tansy), plantain, prickly lettuce, Russian thistle, shepherd's purse, stinkweed, volunteer canola, wild buckwheat, wild radish. Consult 2,4-D ester label for stages and rates.
MCPA ester	Up to 374 m/acre LV ester 600	Susceptible weeds such as burdock (4 leaf stage), cocklebur, mustards(except dog and tansy), lamb's quarters, plantain, prickly lettuce, ragweeds, Russian pigweed, shepherd's purse, stinkweed, annual or volunteer sunflower, volunteer canola, wild buckwheat, wild radish. Consult MCPA ester labels for stages and rates
Curtail M	600 ml/acre	Susceptible weeds such as Canada thistle (low infestations), burdock, cocklebur, field horsetail, lamb's quarters, wild mustard, plantain, prickly lettuce, wild radish, ragweed, shepherd's purse, stinkweed, annual sunflower, volunteer sunflower, vetch. Consult Curtail M label for weed stages and rates.

*Under low wild oat populations (< 75 plants/sq metre), can use a lower rate of Tandem at the low rate/acre when mixed with these products.

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Application Information

With: Apply with ground equipment or by air. **Water Volume**: 20 - 40 L/acre ground or 12 - 20 L for air application.

Mixing Instructions

Half fill tank with water and agitate. Add Tandem A, then Tandem B, then any tank mix partner; add non-ionic surfactant, then finish filling tank.

Application Tips

Only weeds emerged at time of application are controlled. For optimum results, apply Tandem to actively growing seedling weeds. Weed control may be reduced if Tandem is applied under stress conditions. Do not apply to crops that are stressed as crop injury may result. Under conditions of low crop competition and high weed density or wet foliage at time of application, control may be reduced.

How it Works

Tandem A inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids, which are essential for plant growth. Tandem B is a plant growth regulator, which will cause twisting, bending and erratic growth of susceptible weeds.

Expected Results

Tandem rapidly stops the growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 - 3 weeks following application, depending on growing conditions and weed susceptibility. Degree of control and duration of symptoms depend on weed sensitivity, weed size, crop competition, growing conditions following treatment and spray coverage.

Restrictions

Rainfall: Rain within 2 hours of application may reduce control. **Grazing**: Livestock may be grazed on treated crops 7 days following application. **Pre-harvest Intervals**: Do not harvest the treated crop within 60 days after application. **Re-cropping**: Eleven months following an application of Tandem, the following crops can be seeded: barley, brown mustard, canola, dry bean (of the species Phaseolus vulgaris), flax, canola quality Brassica juncea, lentils, oats, field peas, chickpea, spring wheat, soybean and yellow mustard, sunflowers or summerfallowed.

Environmental Precautions

Simplicity is toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of these sensitive areas by using the recommended buffer of 1 metre from water bodies and 2 metres from sensitive terrestrial areas.

Toxicity

Tandem A has a low oral toxicity. Acute LD_{50} (rats) = > 3,129 mg/kg. May cause moderate skin irritation.

Tandem B has a very low mammalian toxicology with acute oral LD_{50} of > 2,000 mg/kg.

Storage

Store in original container in a secure, dry, heated storage. This product will freeze at -10°C. Do not store below -9°C. Allow product to warm above 7°C before using, and thoroughly mix the product prior to use.

Target/Sword/Tracker XP

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Target (PCP# 28028)	Syngenta	MCPA: 275 g/L + mecoprop-P: 62.5 g/L + dicamba: 62.5 g/L	Solution	2 x 10 L, 160 L
Sword (PCP# 27892)	Loveland Products Canada			
Tracker XP (PCP# 27790)	IPCO			

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Crops, Staging and Rates

Rate: 400 - 600 mL/acre.

Crops	Staging	Specific remarks
Barley	2 - 4 leaf	Do not underseed to legumes. For wheat, oats and barley, a maximum of 1 application is permitted per year. For canary seed, a maximum of 2 applications are permitted per year, with a minimum retreatment interval of 90 days.
Canary seed, oats, spring wheat (including durum)	2 - 5 leaf	
Winter wheat	Apply in the spring before the crop is more than 30 cm high (flag leaf extended).	
Summerfallow or fall stubble (Canada thistle control program)	Summerfallow: Early bud stage Fall Stubble: 15 - 20 cm tall or across.	

Note: Applications made later than the recommended timing may result in flattening of the crop and shortening of the straw (particularly under stress conditions).

Target and Sword only
Apply at 2 - 4 leaf stage

Seedling and established grasses grown for forages

creeping red fescue	intermediate wheatgrass	orchard grass	timothy
crested wheatgrass	meadow foxtail	smooth bromegrass	

Established grasses grown for forages

kentucky bluegrass	meadow fescue	slender wheatgrass	tall wheatgrass
meadow bromegrass	pubescent wheatgrass	tall fescue	western wheatgrass

Weeds and Staging

Apply at 2 - 3 leaf stage and actively growing for best results unless otherwise stated

annual sow thistle	green smartweed	perennial sow thistle*	tartary buckwheat
ball mustard	hedge bindweed*	prostrate pigweed	volunteer rapeseed
Canada thistle*	hemp-nettle (before 2nd pair	redroot pigweed	volunteer sunflower
cleavers (1 - 2 whorls)	of true leaves)	Russian thistle (<5 cm high)	volunteer tame buckwheat
common ragweed	knotweed	shepherd's-purse	wild buckwheat
corn spurry	kochia	stinkweed	wild mustard
cow cockle	lady's-thumb	tall mustard	wormseed mustard
field bindweed*	lamb's-quarters	tame buckwheat	yellow mustard
flixweed	night flowering catchfly		

* Top growth control only

Registered Tank Mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Spring wheat (including durum)		
Horizon NG	Target: 400 - 600 mL/acre + Horizon NG: 376 mL/acre	Wild oats and green foxtail. Target only registered for this mix.
Wheat and barley		
Larox	Target/Sword/Tracker XP: 400 - 600 mL/acre + Larox: 172 mL/acre	Chickweed.
Sencor	Target/Sword/Tracker XP: 400 - 600 mL/acre + Sencor: 111 - 172 mL/acre	Chickweed.

Application Information

With: Apply with ground sprayers or by air. **Water Volume**: Ground application: 40 L/acre. Aerial application: 12 L/acre (minimum).

Application Tips

In winter wheat, spray winter annuals as soon as growth begins in spring. Use the 600 mL/acre rate when weeds are not actively growing due to extended periods of hot and dry, or cold and wet, weather prior to or following

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application or when weeds are beyond the 3-leaf stage or for heavy weed infestations. Do not let contents stand for long periods in the tank. Agitate every 8 hours.

How It Works

A combination of 3 systemic hormonal herbicides that accumulate in the growing point of susceptible plants, produce abnormal growth and disrupt the transport system in plants.

Expected Results

Weeds: Can take up to 7 - 14 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and die.

Crop: Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, cocked awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected. Poor results may be expected if there is poor coverage, or weeds are too advanced.

Restrictions

Rainfast: Rainfall within 1 hours will reduce activity. **Grazing**: Do not graze within 7 days of application, and do not cut for forage or hay within 30 days. **Pre-harvest Interval**: Leave at least 60 days from application to harvest. **Re-cropping**: Cereal and broadleaf crops can be grown the year following application.

Environmental Precautions

Target/Sword/Tracker XP are toxic to aquatic organisms and non-target terrestrial plants. Use a 1 m buffer from aquatic and 5 m buffer from sensitive terrestrial habitats.

Toxicity

Target: Slightly acutely toxic. Acute Oral LD_{50} (rats) = 1,750 mg/kg.

Sword: Slightly acutely toxic. Acute Oral LD_{50} (rats) = 1,188 mg/kg.

Tracker XP: Slightly acutely toxic. Acute Oral LD_{50} (rats) = 1,400 mg/kg.

Storage

Heated storage required.

Telar XP

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Telar XP (PCP# 30838)	Bayer CropScience	Chlorsulfuron: 75%	Dry flowable	500 grams

Crops, Staging and Rates

Non-crop Areas: Total vegetation control programs on railroads, utility, highway rights-of-way, airports, plant sites, storage areas, fencelines, utility substations and petroleum storage areas. **Rate**: 6 - 48 g/acre.

Weeds, Rates and Staging

Apply when weeds are small (less than 10 cm tall or across) and actively growing.

Weeds controlled at 6 g/acre + 2,4-D amine: 320 - 640 mL/acre

annual sunflower	hemp-nettle	plantain	shepherd's purse
ball mustard	kochia	prickly lettuce	stork's bill
common ragweed	lady's thumb	redroot pigweed	sweet clover
cow cockle	lamb's-quarters	Russian pigweed	volunteer rapeseed
flixweed	narrow-leaved hawk's-beard	Russian thistle	wild mustard
green smartweed	(spring seedlings)	shepherd's purse	

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Tolar SP (cont'd)

Weeds controlled at 4 g/acre + 1 fl oz/acre: 225 - 450 mL/acre

Weeds controlled at 12 g/acre alone

common chickweed	green smartweed	redroot pigweed	volunteer rapeseed (except CLEARFIELD type)
common groundsel	hemp nettle	scentless chamomile	
corn spurry	lady's thumb	shepherd's purse	wild mustard
cow cockle	lamb's quarters	stork's bill	
flixweed	prickly lettuce		

Weeds controlled at 16 g/acre alone: Weeds controlled at 12 g/acre plus adjuvants

Weeds controlled at 20 g/acre alone: Weeds controlled at 16 g plus following

Canada thistle*	horsetail	Russian thistle	wild strawberry*
dandelion*	kochia**	sweet clover	
golden rod*	perennial sow thistle*	wild rose*	

Broadleaf weed control is among best before vegetation is out doors): Weeds controlled at 40 g/acre alone

Canada thistle	horsetail	perennial sow thistle*	wild strawberry*
dandelion	narrow-leaved hawk's-beard	wild buckwheat	willow*
goldenrod*		wild rose*	

* Suppression

** A recent survey of kochia fields has found 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Note: Addition of recommended surfactant (Ag Surf, Agral 90, Competex or Super Spreader) 0.1% v/v may improve control of weeds growing under adverse conditions.

Registered Tank Mixes

Tank mix partner	Tank mix rate	Remarks
Known + nonionic surfactant	Tolar 40 g/acre + Known 2.75 - 3.6 kg/acre + Non-ionic surfactant 1% v/v	Apply when weeds are small (less than 10 cm tall)

Application Information

Units Ground equipment only. Do not apply by air. Water Volume: Not less than 40 L/acre. Spray volumes of 90 - 100 L/acre are recommended.

Application Tips

Select a spray volume that will ensure thorough coverage and uniform spray pattern. Best results are obtained when weeds are actively growing.

How it Works

Absorbed through the roots and foliage. Inhibits cell elongation.

Expected Results

Tolar rapidly inhibits growth of susceptible weeds. Typical symptoms discolorations of young weeds may not be noticeable for 1 - 3 weeks after application depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on the following factors: rate used, weed sensitivity and weed size, growing conditions at and following treatment, precipitation, soil organic matter and pH.

Restrictions

Rainfall: Rainfall within 2 hours may lower degree of weed control. For best results, sufficient rainfall to move Tolar 5 - 7 cm deep into the soil is required after application before weeds develop an established root system and grow beyond the seedling stage.

Environmental Precautions

Tolar is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified under Directions for Use on the label.

Toxicity

Slightly acutely toxic. Acute Oral LD_{50} (rats) > 1,000 mg/kg. Slightly to moderately toxic by contact.

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Storage
Store in a cool, dry place.

Tensile

Range C: X

Formulations

Product	Category	Active ingredient	Formulation	Maximum use
Apex (EXAMPLE1)	Tensile Growth	Imazamox 15 %	Water-soluble granule	0.5 – 1.1 kg/ha
Lontrel Xtra (EXAMPLE2)	Broad-leaf herbicide	Clopyralid 75%	Water-soluble granule	0.1 – 0.33 kg/ha

See use note 10 below.

Note: Always adjoin required at 0.5% v/v.

Crops, Staging and Rates

Crop	Stage	Rate per area
EXAMPLE3 canola	2 to 4 leaf stage	0.1 L/ha in 100 L/ha — 10 grams of Apex + 10 grams of Lontrel + Always adjoined at 0.5% v/v in EXAMPLE4 LR spray volume

Weeds, Rates and Staging
Weed stage: Leaf stage, unless otherwise noted in the weed table.

Rates
Weed Controlled

Easy weeds (1 - 4 cm rosette leaves, only with 45mg)

barnyard grass	volunteer barley	volunteer wheat over	yellow foxtail
green foxtail	volunteer canola seed	EXAMPLE5 resistant	
Persian darnel	volunteer oats	wild oats	

Moderate weeds - volunteer to 4 leaf stage

annual sow thistle	burdock [1]	shepherd's purse	wild buckwheat [2]
Canada thistle [1]	spiny sowthistle	stinkweed	wild mustard
cleavers [1]	perennial sow thistle [1]	volunteer canola over	
cow cockle	tall sow sowthistle	EXAMPLE6 resistant	
green smartweed	Russian thistle	wild	

[1] Suppression only

[2] Top growth control only

[3] Plants with canopy of bushes fields have found 90% of bushy populations are resistant to Group 2 herbicides. Without testing, assume bushes in your field is resistant and will not be controlled by this product alone.

Registered Tank Mixes
None

Application Information
Rate to Apply: Apply with ground equipment only. Do not apply by air. Use 10 mesh or coarser filter or more. **Water Volume:** Consult LR Users.

Mixing Instructions
Use mixing instructions "X" on page 11.

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[illegible]

Application Tips

[illegible]

How It Works

[illegible]

Expected Results

[illegible]

Restrictions

[illegible]

Environmental Precautions

[illegible]

Toxicity

[illegible]

Storage

[illegible]

Thumper/Approve/Thrasher II/Leader

[illegible]

Formulation

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]			[illegible]
[illegible]	[illegible]			[illegible]

Scope, Weighing and Notes

Item	Details	Note
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Wounds, Stress and Weighing

Wounds considered in 1 - Graded Angle

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	

Wounds considered in 1 - Graded Angle

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	

Wounds considered in 1 - Graded Angle

[illegible]	[illegible]

Registered VoxC-Wave

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

Application Information

[illegible]

Wiring Instructions

[illegible]

Overview: Magnesium Phosphate + Vitamin D and B12

Specifications / Size

Uses & Benefits

Dosage & Benefits

Recommended

Recommendations & Precautions

Warnings

Storage

Titan Pro

Recommendations

Usage, Dosage and Advice

Ingredients

Threats and Mitigations

Threats to the TOE and how they are mitigated are summarized below.

Threat	Mitigation	Notes
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

Application Administration

[illegible] [illegible] [illegible] [

Tordon 22 K

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tordon 22 K (PSPM 4886)	Dow AgroSciences	Picloram 240 g/L	Solution	5 L (D)

Note: Available only through selected retail outlets.

Crops, Staging and Rates

Rangeland, permanent grass pastures and non-cropland. For spot treatment on cultivated cropland (when applied by authorized pesticide applicators). Apply to any stage of permanent grass pastures, rangeland and non-cropland. **Rate:** 40 – 160 L/acre.

Note: Legumes are susceptible to Tordon 22K. Do not spray pastures containing forage legumes unless the kill of such legumes can be tolerated.

Weeds, Rates and Staging

Apply any time when grass fully developed leaves are present.

Weeds	Rate	Acres treated per 10 L container
[illegible]	160 L/acre	40
[illegible]	120 L/acre	53
[illegible]	1.25 L/acre	8
[illegible]	0.63 L/acre	16

Application Information

Note: Apply with ground sprayers, backpack sprayers or handgun. See label for application information for a backpack sprayer. **Water Volume:** 100 – 200 L/acre.

Application Tips

Tordon 22K, used as a spot treatment in a crop. No spot treatment should exceed 1 acre, and the total area treated in any 1 field in a year should not exceed 5% of the field. Tordon 22K is persistent. It will carry over in soil. Treated soil should not be removed out of the treated area. Tordon 22K is very difficult to clean from sprayers. Use a different sprayer for applying other materials to desirable plants or crops. Handguns equipped with proportioning devices and reservoirs for Tordon 22K are useful in preventing sprayer contamination.

Crop & Weeds

Injurious with soil drenches, causing leaf cupping, stem distortion and eventual death of plant. Tordon 22K is absorbed through leaves and roots.

Expected Results

Tordon 22K. Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually entire plant increases in abundance as a result of reduced competition.

Restrictions

Rainfall: Heavy rainfall shortly after application may cause poor results. **Grazing:** Do not graze treated area by dairy animals within 3 weeks after treatment. Clippings from grass or crops which have been treated with Tordon 22K should not be used for composting or mulching, nor should the manure from animals grazing treated areas or

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Soil treated bungs be used around susceptible plants. **Re-cropping** Picloram may persist in the soil for a period of up to five years, therefore, it should not be used in those areas where sensitive broadleaved crops such as sunflowers and potatoes are grown in the rotations. Where wheat, oats or barley are the major crops in the rotations, it is recommended oats are grown in the first year, oat or barley the second year, then oats, barley or wheat the third year after treatment.

Environmental Precautions

Buffer zones are 1 metre for aquatic habitats and 120 metres for sensitive terrestrial habitats. Tordon 22k is moderately toxic to fish. Do not apply to any water bodies or in areas where the runoff from treated areas will reach fish-bearing waters. **Leaching** Picloram is highly mobile in the soil and will readily move with water. Do not apply to soils that are very permeable.

Toxicity

Low oral toxicity. Acute oral LD_{50} (rats) = > 5,000 mg/kg. Low dermal toxicity.

Storage

Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.

Travallas

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Travallas (PER# 91888)	[illegible] DuPont Canada Co.	Metsulfuron-methyl: 3 g/L + Aminopyralid: 30 g/L + fluroxypyr: 150 g/L	Suspension	8 L jug

[illegible] weeks (6) acres

Crops, Staging and Rates

Crop	Staging (Label/Growth Stage)
Wheat (spring and durum)	2 leaf - flag leaf (shot blade)
Barley	

Weeds Controlled

Weeds less than 10 cm in height or diameter unless otherwise noted. Travallas applied at 200 mL/acre.

Canada thistle[1]
chickweed (1 - 8 leaf)
cleavers (1 - 6 whorl)
corn spurry
cow cockle
dandelion (rosettes up to 25 cm in diameter)

hemp-nettle
kochia (not Group 2 resistant)
lady's thumb/green smartweed
lamb's quarters

narrow-leaved hawk's beard
redroot pigweed
Russian thistle
shepherd's purse
stork's bill

vol. canola (except CLEARFIELD varieties)
white cockle
wild buckwheat (1 - 8 leaf)
wild mustard

[1] Suppression only

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Treflias (cont'd)

Registered Tank Mixes

Tank mix partner	Product rates	Additional pests controlled
Spring wheat (incl. durum) and barley		
MCPA Ester 500 or 600	226 mL/acre for 500, 190 mL/acre for 600	Volunteer CLEARFIELD canola 2 - 4 leaf
Acapela fungicide	175 - 250 mL/acre	Cereal leaf diseases controlled or suppressed by Acapela.
Spring wheat (excluding durum) and barley		
Axial 100 EC + Adigor adjuvant	243 mL/acre Axial + 283 mL/acre Adigor	Wild oats
Spring and durum wheat		
Horizon 240 EC + Score	93 mL/acre Horizon 240 + 0.8 L/100 L spray of Score adjuvant	Wild oats
Simplicity + adjuvant	202 mL/acre Simplicity + 0.25% v/v of adjuvant	Wild oats
Traxos	486 mL/acre	Wild oats
Spring wheat only		
Everest + adjuvant	19 - 29 mL/acre + 0.25% v/v of adjuvant	Wild oats

Application Information

How to Apply: With ground or aerial equipment. **Water volume:** Ground, minimum 22 L/acre. Aerial, 10 L/acre.

Application Tips

Optimal herbicide activity requires an actively growing crop and weeds. Best temperature for application is between 12°C and 24°C. Treflias works through maximum foliar uptake and contact activity. Frost three days before or after application may reduce weed control and crop tolerance. Consult label for mixing instructions. Shake well before using.

How it Works

Treflias is a mix of three active ingredients from two modes of action. The thifensulfuron and metsulfuron methyls are absorbed by foliage and roots, translocating throughout the plants and concentrating in areas of rapid growth. There, they inhibit cell division. Fluroxypyr is a Group 4 herbicide, an artificial plant hormone, that disrupts normal growth, causing plant twisting and eventual death.

Expected Results

Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions

Rainfall: Treflias is rainfast in 2 hours. **Grazing:** Do not graze or feed the treated crop to livestock within 7 days of application. **Pre-harvest Interval:** Do not harvest the treated crop within 60 days of application. **Re-cropping:** The following crops may be seeded 10 months after application: canola, flax, oats, peas, spring wheat (including durum), spring barley.

Environmental Precautions

Buffer zone of 1 to 5 metres for ground application from sensitive aquatic and terrestrial habitat. Avoid spraying areas potentially susceptible to runoff.

Toxicity

Low acute mammalian toxicity. Toxic to aquatic organisms. Metsulfuron-methyl, oral LD_{50} (rats) = > 5,000mg/kg; thifensulfuron-methyl, oral LD_{50} (rats) = > 5,000 mg/kg; fluroxypyr, oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

If product is stored below freezing for an extended time, slowly warm to a minimum of 10°C and shake well before using.

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Traxos

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Traxos (PCP# 29855)	Syngenta	Pinoxaden: 25 g/L + clodinafop propargyl: 25 g/L	Emulsifiable concentrate	2 x 10 L, 80 L, 400 L

Crops, Staging and Rates

Crop	Stage	Rate
Spring and durum wheat	Prior to 4th tiller (do not apply past flag leaf)	500 mL/acre

Note: Traxos contains a built-in adjuvant system, DO NOT add any adjuvant to the Traxos herbicide mixture

Weeds and Staging

Grassy weeds controlled	Growth stage	Additional remarks
Wild oats, tame oats, volunteer canaryseed, proso millet	1 - 6 leaf on the main stem	Prior to emergence of 4th tiller
Green foxtail, yellow foxtail	1 - 5 leaf on the main stem	For optimum control apply prior to emergence of 3rd tiller
Barnyard grass, Persian darnel		For optimum control apply before tillering and while actively growing.

Registered Tank Mixes

Tank mix partner	Product rates	Crop stage[1]
Buctril M [4, 5]	404 mL/acre	2 leaf to flag leaf
Curtail M [4]	606 - 810 mL/acre	3 leaf to just before flag leaf
Trophy [2, 4]	240 mL/acre of Trophy A + 453 mL/acre of Trophy B	3 leaf to flag leaf
Prestige [3, 4]	243 - 324 mL/acre of Prestige A + 606 - 810 mL/acre of Prestige B	3 leaf to flag leaf
Benchmark [4, 5]	40 mL/acre of Benchmark A + 486 mL/acre of Benchmark B	2 to 6 leaf
Infinity [5]	336 mL/acre	1 to 5 leaf
Pulsar [3]	246 - 371 mL/acre	2 to 5 leaf
Pulsar [3] + MCPA Ester[4] 600	246 - 371 mL/acre + 234 mL/acre	2 to 5 leaf
MCPA Ester[4] 600	283 - 372 mL/acre	3 leaf to flag leaf
Mextrol 450 [5]	500 mL/acre	2 leaf to flag leaf
Matador 120EC	26 - 33 mL/acre	Prior to emergence of 4th tiller
Tilt 250E	101 - 202 mL/acre	Prior to emergence of 4th tiller

[1] Always consult the label of the broadleaf herbicide, insecticide or fungicide prior to use. [2] Rates above 2.0 L/ha may cause crop injury. [3] Refer to broadleaf tank mix label for list of weeds controlled at low and high use rates. [4] A reduction in barnyard grass control may be observed when Traxos herbicide is tank mixed with these broadleaf herbicides. [5] A reduction in green foxtail control may be observed when Traxos herbicide is tank mixed with these broadleaf herbicides.

Application Information

Water Volume: Ground: 20 - 40 L/acre. Aerial: 12 L/acre.

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Traxos (cont'd)

Mixing Instructions

Half fill tank with water using continuous agitation. Add tank mix partner, then add Traxos. Agitate for several minutes between application of herbicides.

Application Tips

When tank mixing Traxos herbicide with a tank mix partner, ensure you read the tank mix partner label for minimum water recommendations. For optimum control, apply Traxos herbicide to actively growing weeds, ideally at the 2-3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Traxos herbicide will not be controlled.

Weed control under stress conditions can be reduced or delayed. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it Works

Traxos herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected Results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and complete control three to five weeks after application. Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures.

Restrictions

Rainfall: Traxos herbicide alone can be used one hour before rainfall. **Grazing**: Observe a minimum of 7 days before grazing livestock. **Pre-harvest Intervals**: 60 days after treatment for grain and straw and 30 days after for hay. **Re-cropping** Restrictions: There are no crop limitations the year following application of Traxos.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave a 1 metre buffer between treated area and sensitive vegetation and aquatic habitats.

Toxicity

Low toxicity. Pinoxaden: Acute oral LD_{50} (rats) = 3,129 mg/kg. Clodinafop-propargyl: Acute oral LD_{50} (rats) = 2,276 mg/kg.

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

TraxosTwo

Group 1, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
TraxosTwo Grass Component (PCP# 31647)	Syngenta	Pinoxaden: 25 g/L + clodinafop-propargyl: 25 g/L	Emulsifiable concentrate	10 L jug
TraxosTwo Broadleaf Component (PCP# 31673)		Fluroxypyr: 90g/L 2,4-D: 360 g/L	Emulsifiable concentrate	9 L jug

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Crops, Staging and Rates

Crop	Stage	Rate
Spring wheat, durum	4 leaf, prior to the emergence of the 4th tiller	500 ml/acre of TraxosTwo Grass Component 445 ml/acre of TraxosTwo Broadleaf Component

Note: Traxos contains a built-in adjuvant system, DO NOT add any adjuvant to the TraxosTwo herbicide mixture.

Weeds, Rates and Staging

Grassy weeds

Crops	Staging	Notes
Wild oats, volunteer canary seed, volunteer (tame) oats, proso millet	1 - 6 leaf stage on the main stem	Prior to the emergence of the 4th tiller
Green foxtail, yellow foxtail (wild millet, pigeon grass)	1 - 5 leaf stage on the main stem	Prior to the emergence of the 3rd tiller and when foxtail is actively growing
Barnyard grass, Persian darnel	1 - 5 leaf stage on the main stem	Apply before tillering and when the plants are actively growing

Broadleaf weeds controlled:

bluebur
burdock
canola (volunteer)
cleavers (1 - 8 whorl)
clovers (sweet and grey tansy)
cocklebur
field horsetail*
flixweed
goat's-beard
hemp nettle (2 - 6 leaf)
hoary cress*
kochia* *
lamb's quarters
mustards (except green tansy, dog wild buckwheat (1 - 6 leaf)
plantain
prickly lettuce
ragweed
round-leaved mallow (1 - 6 leaf)
shepherd's purse
stinkweed
storks' bill (1 - 8 leaf)
sunflower (annual)
vetch
volunteer flax (1 - 12 cm)
wild radish

Broadleaf weeds suppressed:

common chickweed* * (up to 8 cm)
red root pigweed
sow-thistle (perennial)*

*Top growth control only.

* * Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

Broadleaf weeds controlled with a tank-mix 2,4-D ester herbicide

To control or suppress the following weeds, use 445 ml/ac of TraxosTwo broadleaf component and with 68 ml/ac of 2,4-D ester 600.

Controlled:

blue lettuce*
dandelion* *
docks
dog mustard
field bindweed*
field peppergrass
hairy galinsoga
hedge bindweed
lady's thumb
leafy spurge*
oak-leaved goosefoot
redroot pigweed
Russian thistle
smartweed
tansy mustard
tartary buckwheat
wild buckwheat (1 - 8 leaf)
gumweed

Suppressed:

common chickweed * * * (up to 8 cm)
Canada thistle*
sow-thistle (perennial)*
sow-thistle (annual)

*Top growth control. * *Spring rosettes. * * *Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

Registered Tank Mixes

Tank mix partner	Tank mix partner rate	Remarks
Spring wheat (incl. durum) and barley		
2,4-D Ester		
Matador 120 EC	25 - 34 ml/ac	Prior to emergence of 4th tiller
Tilt 240E Fungicide	101 - 202 ml/ac	Prior to emergence of 4th tiller

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TraxosTwo (cont'd)

Application Information

Water Volume: Ground: 5 - 10 g/ac. Aerial: 3 - 5 g/ac.

Mixing instructions

Fill tank half full, add TraxosTwo Broadleaf Component, keep filling and add TraxosTwo Grass Component. When adding a tank mix, always add the TraxosTwo Broadleaf Component, followed by the fungicide/insecticide and the TraxoTwo Grass Component last.

Application Tips

Application before the 4 leaf stage of wheat may cause severe twisting of leaves and stem and head deformities, which may reduce yield up to 10%. Do not apply later than the flag leaf stag. Maximum one application per year.

How it Works

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to two weeks of application.

Expected Results

Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to two weeks of application. Further colour changes and loss of vigour will be observed, followed by browning and complete control within three to five weeks. The TraxosTwo Broadleaf Component is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12 - 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before an application (3 days) or shortly after may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g. drought, heat or cold stress, or if weeds have initiated flowering or if heavy infestation exists.

Restrictions

Do not apply on barley or any crop other than spring wheat or durum, as crop damage will result. Do not allow spray to drift to adjacent fields seeded to crops other than spring wheat or durum wheat. Do not treat wheat underseeded to forage. **Rainfall:** Do not apply within 2 hours of rainfall. **Grazing:** Do not permit lactating dairy/beef animals to fields within 7 days of application. Do not harvest for grain or straw until 60 days after application. Withdraw meat animals from fields at least 3 days before slaughter. **Re-cropping:** Fields treated with TraxosTwo can be replanted to wheat, barley, oats, triticale, alfalfa, edible beans, canola, lentils, peas, potatoes, soybeans, sugar beets and sunflowers.

Environmental Precautions

Toxic to aquatic organisms, birds, small wild mammals and non-target terrestrial plants. **Buffer zones:** Field sprayer: 1 metre for fresh water, estuarine/marine habitats and terrestrial habitats. Aerial: 5 metres for fixed wing and 2 metres for rotary wing for fresh water, and 1 metre for estuarine/marine habitats; 50 metres for fixed wing and 45 metres for rotary wing for terrestrial habitats.

Toxicity

Low acute toxicity: oral LD_{50} (female rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage

Store in original containers in secure, dry heated storage. If product is frozen, bring to room temperature and agitate before use. Keep away from feed and foodstuffs and out of reach of children and animals. Keep away from fire or open flame or other sources of heat.

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trifluralin

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Bonanza 10G (PCP# 22744)	Loveland Products Canada	trifluralin: 10%	Granules	22 kg bag, 500 kg bulk bag
Bonanza 480 EC (PCP# 28288)	Loveland Products Canada	trifluralin: 480 g/L	EC	9.45 L, 205 L
Rival 10 G (PCP# 18826)	Nufarm Agriculture	trifluralin: 10%	Granules	22.7 kg bag, 454 kg bulk bag
Rival EC (PCP# 18612)	Nufarm Agriculture	trifluralin: 500 g/L	EC	9 L, 900 L
Treflan EC (PCP# 23833)	Dow AgroSciences	trifluralin: 480 g/L	EC	9.45 L, 115 L

Oilseed and Special Crops

Crops, Staging and Rates

Rate: see Rates table below 0.69 - 3.72 L/acre. Not all the trifluralin formulations are registered for the crops listed below. Please refer to the specific product label for details. Granules applied in the fall only (after Sept. 1 but before soil freeze-up). All products are for pre-plant-incorporated use only.

- alfalfa establishment (flax and canola cover crops only)
- asparagus (established - 3 years)
- barley (fall only for granular products)
- black beans
- canola (8.5)
- dry common beans (kidney, white)
- faba beans
- flax (summer and fall only)
- forage legumes (seedling alsike clover, red clover, cicer milkvetch, bird's-foot trefoil)
- lentils (fall only)
- peas (field, canning)
- safflower
- saskatoon berries
- soybeans
- strawberries
- sunflower (8.5)
- sweet clover
- transplanted shelterbelts
- vegetables (broccoli, brussel sprouts, cabbage, cauliflower, carrots, rutabaga, transplanted tomatoes)

Weeds Controlled

- annual bluegrass
- barnyard grass
- carpetweed
- cheatgrass (downy bromegrass)
- chickweed
- cow cockle
- crabgrass
- goosegrass
- knotweed
- lamb's-quarters
- millet (green and yellow foxtail)*
- meadow bromegrass
- Persian darnel
- pigweed
- purslane
- Russian thistle
- stink grass
- wild oats**
- wild buckwheat

* Excluding Group 3 resistant foxtails.

** Suppression

Spring Application: Trifluralin can be applied immediately prior to planting or up to three weeks before planting.

Summer Application: Trifluralin can be applied to summerfallow between June 1 and September 1 for weed control in canola or flax the following year. Apply the summer rate and incorporate (see Incorporation sections). Not recommended for sand and sandy loam soils. Trifluralin must be incorporated at least twice with the implement operated in two different directions. The initial incorporation must be done within 24 hours after application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the fallow season. Shallow tillage (5 to 8 cm) is necessary in the spring prior to planting.

Summerfallow: Bonanza 10 G and Rival 10 G can also be applied to summerfallow in May, June or July for weed control during both years of a fallow-wheat rotation or in the fall (September - prior to soil freeze-up) prior to spring and durum wheat seeding.

Crop Year

- wild millet (green foxtail and yellow)*
- lamb's-quarters
- wild buckwheat
- wild oats

Summerfallow year (above weeds as well as)

- barnyard grass
- cow cockle
- Persian darnel
- red root pigweed
- Russian thistle

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trifluralin (cont'd)

Fall Application: Trifluralin can be applied in the fall between September 1 and prior to soil freeze-up for weed control the following year. Apply fall rates and incorporate twice. The initial incorporation must be done within 24 hours after application. It is preferred to do both incorporations in the fall followed by tillage (7 to 8 cm) in the spring prior to planting. However, one incorporation may be done in the fall and the second in the spring at the time of seedbed preparation, provided both operations are done at the recommended depth. Note: Do not apply to stubble where the previous crop was treated with another trifluralin product (Bonanza, Rival or Treflan). This includes the application the previous summer or fall.

Rates

Spring Applications

Crop	Soil texture and soil organic matter (%)			
	Light (sand / sandy loam)		Medium / heavy (loam to clay)	
	0 - 3%	3 - 10%	0 - 3%	3 - 10%
Field crops: Black beans, cowpeas, dry beans (field and kidney), faba beans, mustard, peas (field and cranberry), canola, safflower, sunrise, sunflowers				
Bonanza EC	0.69 L/acre	0.69 L/acre	0.92 L/acre	0.92 L/acre
Rival EC	0.45 L/acre	0.89 L/acre	0.89 L/acre	0.89 - 1.13 L/acre
Treflan EC	0.65 L/acre	0.93 L/acre	0.93 L/acre	0.93 - 1.27 L/acre
Vegetables: Asparagus, carrots, cucumbers, green peas, lima beans, onions				
Bonanza EC	1.38 L/acre	1.72 L/acre	1.72 L/acre	1.72 L/acre
Rival EC	1.80 L/acre	3.6 L/acre	3.6 L/acre	3.6 L/acre
Treflan EC	1.3 L/acre			1.76 L/acre
Vegetables and herbs: Jerusalem artichokes, broccoli, Brussel sprouts, cabbage, cauliflower, carrots, cabbage, horseradish, Chinese cabbage, kohlrabi, leek, lettuce, parsnips, rutabagas				
Bonanza EC	0.69 L/acre	0.83 L/acre	0.83 L/acre	0.83 - 1.17 L/acre
Rival EC	0.45 L/acre	0.89 L/acre	0.89 L/acre	0.89 L/acre
Treflan EC	0.65 L/acre	0.93 L/acre	0.93 L/acre	0.93 - 1.27 L/acre
Forage: Legumes, timothy, clover, red clover, white sweetclover, alsike clover, birdsfoot trefoil (seed production and forage)				
Bonanza EC	0.69 L/acre	0.83 L/acre	0.83 L/acre	0.83 L/acre
Rival EC	Not registered	Not registered	Not registered	Not registered
Treflan EC	0.65 L/acre	0.83 L/acre	0.93 L/acre	0.93 L/acre

For use in canola, peas, mustard, sunflowers and fababeans (fall only). First incorporation should occur with 24 hours of application.

Products	Soil type	
	Light soils with < 3% organic matter	Medium to heavy soils with 3 - 10% organic matter
Bonanza 10G	4.45 kg/acre	5.7 - 8.9 kg/acre
Rival 10G	3.44 kg/acre	4.45 - 5.57 kg/acre

For use in flax or lentils (fall only)

Products	Soil type			
	Light soils with < 3% organic matter		Medium to heavy soils with 3 - 10% organic matter	
	Sand / sandy loam	Loam / clay	Sand / sandy loam	Loam / clay
Bonanza 10G	4.45 kg/acre	4.45 - 5.6 kg/acre	5.57 kg/acre	5.57 - 6.68 kg/acre
Rival 10G		4.45 kg/acre		
Bonanza EC	0.83 L/acre	0.83 L/acre	1.17 L/acre	1.17 L/acre

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Products	Soil type			
	Light soils (soils < 6.0% organic matter)		Medium to heavy soils (soils > 6.0% organic matter)	
	Small / weak insect	Large / other	Small / weak insect	Large / other
Knat GT	0.45 L/acre	0.68 L/acre	0.75 L/acre	1.0 – 1.36 L/acre
Ivalice GT	0.45 L/acre	1.27 L/acre	1.7 L/acre	2.27 L/acre

Cereals (barley and wheat)
Fall application Between September 1 and freeze up to suppress or control *Wheat stem sawfly*[1] in barley.

Products	Soil type					
	C (0% organic matter)[2]		**M (2.5% organic matter)**		**H (10% organic matter)**	
	Small / weak insect					
	Rate for small / weak insect	Rate for large / other insect	Rate for small / weak insect	Rate for large / other insect	Rate for small / weak insect	Rate for large / other insect
Knat 100 E	0.45 kg/acre	0.45 kg/acre	0.45 kg/acre	0.45 kg/acre	0.45 kg/acre	0.57 kg/acre
		0.68 kg/acre		0.45 kg/acre	0.45 kg/acre	0.57 kg/acre

[1] Ivalice, Knat and Knat GT will not control Wheat stem sawfly.

[2] Caution: For barley, do not apply Knat 100 E or Knat GT on fine textured soils or other soils containing less than 2% organic matter or on shallow, gravelly soils containing more than 6% organic matter.

Fall application Between September 1 and freeze up to suppress or control *Wheat stem sawfly*[1] in wheat.

Products	All soils (< 6% organic matter)
Knat 100 E	0.45 kg/acre

[1] Ivalice, Knat and Knat GT will not control Wheat stem sawfly.

[2] Caution: 0.45 kg/acre is the maximum rate for wheat. Do not use higher rates for wheat as crop injury may result.

Spring application to wheat and barley for control of adults (grass hosts) – Post-plant, non-germinal (between or after seedings)

Products	Light textured soils	Medium textured soils	Heavy textured soils
Knat GT	0.45 L/acre	0.45 L/acre	0.75 L/acre
		0.57 L/acre	0.95 L/acre
Ivalice		0.45 L/acre	0.68 L/acre

Caution: Wheat or barley may be injured if seeded through a treated band or into a heavily incorporated layer of Ivalice.

Registered Tank Mixes

Permissible: Liquid products may be mixed with liquid nitrogen fertilizer (e.g., 28-0-0) for pre-plant and non-germinal application. Before the Ivalice is added to the tank, compatibility of Ivalice in the liquid fertilizer should be tested following instructions on Ivalice label.

Ivalice liquids may be blended with dry bulk fertilizer. Application should be made as soon as possible after blending. With the exception of ammonium nitrates, all other commonly used dry fertilizers may be used for Ivalice liquid segregations.

Not Permitted: Spring application – Post-plant, non-germinal (between or after seedings)

Crop	Type etc	Soil texture	
		Light to medium	Heavy
Downy	Cultivar or Synonym or Weed 1 Months BBCH	Cultivar or Synonym or Weed BBCH or more months BBCH – BBCH or more	Cultivar or Synonym or Weed or more months BBCH or more months BBCH – BBCH or more
Wheat	Cultivar or Synonym or Weed kg/ha Months BBCH	Cultivar or Synonym or Weed BBCH or more months BBCH – BBCH or more	Cultivar or Synonym or Weed or more months BBCH or more months BBCH – BBCH or more

Overcropping advice

Autumn/Winter: Full dose +/– soil tillage ops: Complete formulations must be overcropped in two or more cuts in the implement operated in two different directions. The first overcropping should be in the same direction as application within 24 hours of application. Second at the right angle to the first cut should be done on a minimum of 7 – 14 days. For best results, perform both overcropping in the cut followed by tillage 2 or 3 cm and to the spring price or planting.

Autumn: 45kg ai /ha: The initial overcropping must be done within 24 hours of application. The second overcropping and subsequent overcropping may be done where or necessary as above, maximum could prevent during the remainder of the autumn/winter.

Full applied thereto: All liquid formulations must be overcropped in two or more cuts in the implement operated in two different directions. The initial overcropping must be done within 24 hours after application. The second overcropping and subsequent overcroppings may be done where or necessary as above, maximum could prevent during the remainder of the winter season. Shallow tillage 2 or 3 cm or necessary at the spring price or planting.

Full applied granules in wheat and barley: Granules can be applied in the soil layer in or between 7 operations to and mixed up for the control of grass weeds in the following one. Complete should be applied in standing, bulbing or pre-ear/ear stability. The initial overcropping must be done within 24 hours of application. For best results, it is recommended to do both overcroppings in the cut followed by tillage 2 or 3 cm and to the spring price or planting.

If winter: Full application is not recommended in situations where both of these are in combination with repeated overcropping would have to be cut / spread in a pattern.

Spring granules in case of seedings: Complete formulations: overcropping in two or more directions using a rotating disc, shallow disc, drill or tine in a threshold 4 cm / with mm cut in a cut 4 or +/– up into the first overcropping. The first overcropping should be done as soon as possible after application, but can be done up to 1 – 2 days. The second overcropping can be done at the 4 days 7 – 7 days following the first overcropping. Any debris from the previous volume of granules / pellets can and granules and erosion from / pellets dissolved in to soil.

Spring liquid formulations in cereals and grasslands crops: in case of seedings must be overcropped in two or more with the implement operated in two different directions. The initial overcropping must be done within 24 hours after application. The second overcropping should be a shooting or / with mm in two directions at the same depth and time prior to planting. Shallow tillage 2 or 3 cm or necessary at the spring price or planting.

Spring liquid formulations in wheat and barley: Liquid formulations must be applied after cooling and drying to 2 – 4 cm, overcropped with in an or diamond weed harrows and made into soil, operating in a minimum speed of 4 km/hr. The first overcropping should be performed in the same direction of application. The second overcropping should be performed at the right angle to the first. Both overcroppings should be done within 24 hrs of application.

Application rates

Do not apply on soils that are cold, or poor drill and contain >5% of stone organic matter. Do not apply on soils with more than 5% organic matter. Application on to soils under a cloth is not recommended.

Do not apply on fields spread with manure during past 12 months. Do not apply on soils that are water-logged or likely to be flooding. Do not apply: prevents transplanted on soil/ha, or the soil for clover under the crop from under to the optimum activities over one treated with unfavourable treated problems. Free remedies application under to the one crop common on soil. Good use a from, starter, could from excellent using a double any grass and a has with on to avoid 1 or 2 on drop. If a there or on seeder in need for seeding, maximum gaining always use, and to successful. Remove to use must be a covered such that the there or on seeder 2 on to cultivated, place the from 1 or 2 on deep with the condition should be made, practical or harrow-of after seeding or grasses good germination. **Where**: In crop drop seeding, loose seedbed and seeding as / cold soils. When seeding over the soil / check, species are should be / drop or a maize shallow seeding. Light soils on more they or consideration to be. **Rate and Liquids**: Shallow to / 45 mm pack, the soil in the spring or / cover a more seedbed and accurate depth of seeding. Cover are / of packed and / loose seedbed. Do not seed deeper than 4 cm.

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Triton C

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[redacted]

Environmental Precautions

[redacted]

Storage

[redacted]

Storage

[redacted]

Problem 6

[redacted]

Assumptions:

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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Image and Imaging:

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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Model and Imaging

[redacted]

Image analysis provided:

[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]

Registered Tank Mixes

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (excluding durum)		
Express	2 X-E-U-S® TIS water: 350 mL/acre + Express: 0.7 - 1.7 g grams/acre	Green foxtail, wild oats, volunteer oats
Spring wheat, durum wheat and barley		
Pixxaro Super™	2 X-E-U-S® TIS water: 350 mL/acre + Pixxaro Super™: 150 mL/acre	Green foxtail

1) Loveland supports the following mixes that are not on the Triton K label. Apply mixes according to the most restrictive use limitations for either product (Express EX, Pixxaro Advance, Sierra EX and Harmony Extra SG-XC).

Application Information

With Ground equipment only. Do not apply by air. **Water Volume** 22 L/acre (minimum).

Mixing Instructions

Use mixing instructions 'B' on page 15.

Application Tips

Apply when air temperature is between 10 and 27°C. Do not apply when there is a risk of severe drop in night temperature. Application to stressed crops may result in crop injury. Drought, disease or insect damage following application may also result in crop injury. Under certain conditions, temporary crop colour lightening and occasionally, a slight reduction in crop height may occur. Effectiveness of Triton may be reduced if it remains in the tank for more than 24 hours. With any chemfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at the time of application will be controlled.

How It Works

Absorbed through foliage. Inhibits cell elongation. Causes auxin elongation, leaf cupping or curling.

Expected Results

Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions

Rainfall Requires 4 - 6 hours to be absorbed, longer under cool, damp conditions. **Grazing** Do not permit lactating dairy animals to graze fields within 7 days after application. **Pre-Harvest Interval** Allow at least 30 days between application and harvest.

Environmental Precautions

Triton K is toxic to aquatic organisms and non-target terrestrial plants. Leave a 1 - 8 metre buffer between treated area and sensitive wildlife and aquatic areas.

Toxicity

Triton K is a combination package of 2 products: Refine SG and Dicamba. Refine SG: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg. Dicamba: Moderate oral toxicity. Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place.

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Trophy 600/Rush M

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Trophy 600 A (PCP# 301140)	Nufarm Agriculture	Fluroxypyr: 180 g/L	Emulsifiable concentrate	4.8 L
Trophy 600 B (PCP# 27883)		MCPA: ester 600		7.5 L
Rush M, Fluroxypyr 180 (PCP# 30110)	ADAMA Canada	Fluroxypyr 180: 180 g/L	Emulsifiable concentrate	4.8 L
Rush M MCPA		MCPA ester 600 g/L	Emulsifiable concentrate	7.5 L

Crops, Staging and Rates

Crop	Staging	Rate
Barley	Apply from the 3 leaf up to the flag leaf (fully expanded).	Trophy A/Fluroxypyr 180: 240 g/L + Trophy B/MCPA: 375 mL/acre
Spring wheat (including durum)		
Canary seed		

Weeds and Staging

Unless otherwise noted, apply at 2 - 4 leaf stage.

annual sunflower
burdock
cleavers (1 - 4 whorl)
cocklebur
flixweed
green smartweed*
hempnettle (2 - 6 leaf)
kochia (including Group 2 resistant biotypes)
lamb's quarters
prickly lettuce
ragweed
redroot pigweed (1 - 4 leaf)
shepherd's-purse
stinkweed
stork's-bill* (1 - 8 leaf)
sunflower
vetch
volunteer canola
volunteer flax (1 - 12 cm)
wild buckwheat* (1 - 4 leaf)
wild mustard
wild radish

* Suppression only

One case of Trophy treats 20 acres
One case of Trophy 600 treats 20 acres

Registered Tank Mixes

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (including durum) and feed barley only		
Achieve Liquid/Nufarm Tralkoxydim/Beun + appropriate adjuvant 0.5% v/v	Trophy/Rush M + Achieve/Nufarm Tralkoxydim/Beun + appropriate adjuvant 0.5% v/v	*Wild oats and green foxtail.*
Assert + pH adjustor	Trophy/Rush M + Assert: 125 - 640 mL/acre	*Wild oats:* 1 - 3 leaf stage: 125 mL/acre. *Wild oats:* 1 - 4 leaf stage: 640 mL/acre.
Avoid	Trophy/Rush M + Avoid: 500 mL/acre	*Wild oats, green foxtail, yellow foxtail, barnyard grass.*
Puma Advance, MidEast, Bengal, Cardon	Trophy/Rush M + Puma Advance: 412 mL/acre or MidEast, Bengal, Cardon: 312 mL/acre	*Wild oats.*

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Trophy 600/Rush M (cont'd)

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (excluding durum)		
Horizon NG, NextStep NG, (no adjuvant, Foothills/Signal/Ladder/Legend + adjuvant)	Trophy/Rush M + Horizon NG/NextStep NG: 376 mL/acre or Foothills/Signal/Ladder: 93 mL/acre + appropriate adjuvant	Wild oats and green foxtail.
Spring wheat (including durum)		
Traxos	Trophy/Rush M + Traxos: 500 mL/acre	Wild oats, green foxtail, barnyardgrass, Persian darnel.

* For Trophy 600 B, rate is 372 mL/acre. Respective labels for Trophy and Trophy 600 detail appropriate mixing procedures.

Application Information

With: Apply with ground equipment only. Do not apply by air. **Water Volume**: 40 L/acre.

Mixing Instructions

Half fill tank with water, agitate continually, add Trophy A, then Trophy B, then complete filling with water.

Application Tips

Spray under optimal conditions, which includes temperatures ranging from 12°C to 24°C. Reduced activity will occur with temperatures below 8°C or above 27°C. Frost shortly before application or shortly after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions. Wet foliage at time of application may result in reduced weed control. Application on cleavers can be made up to 6 whorl (20 cm height) stage. Do not apply to wheat and barley underseeded to legumes. Make only one application per year. Application prior to 3 leaf stage of wheat and barley may cause severe twisting of leaves and leaf stem and head deformities, which may reduce yield. Do not apply later than flag leaf stage of crop.

How it Works

Trophy/Rush M herbicide tank mix is non-residual. The components of Trophy/Rush M tank mix move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected Results

Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Do not apply if rain is expected in 1 hour. **Grazing**: Do not permit any grazing or cut for hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest Intervals**: Do not harvest the treated crop within 60 days after application. **Re-cropping**: Fields previously treated with Trophy/Rush M herbicide tank mix can be seeded the following year to wheat, barley, oats, rye forage grasses, flax, lentils, peas, canola and mustard, or summerfallow. Do not seed crops other than those listed above for at least one year following treatment.

Environmental Precautions

Trophy/Rush M is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Toxicity

MCPA has moderate acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 700 - 880 mg/kg. Fluroxypyr has very low mammalian toxicity. Acute oral LD_{50} = > 2,000 mg/kg.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

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Tropotox Plus/Clovitox Plus/Topside

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Clovitox Plus (PCP# 264886)	IPCO	MCPB (Na-salt): 375 g/L + MCPA (K-salt): 25 g/L	Solution	10 L jug
Tropotox Plus (PCP# 8211)	Nufarm Agriculture			
Topside (PCP# 22003)	Loveland Products Canada			

Crops, Staging and Rates

Crop	Stage	Rate
Cereals: barley, oats, rye, wheat	Apply from 2 leaf stage to flag leaf stage.	1.11 L - 1.72 L/acre
Field Pea	Apply when peas have 3 to 6 expanded leaves.	
Field corn	After the crop is 45 cm high, but before the beginning of tasselling. Drop nozzles should be used.	
Pasture	After grazing or cutting, when weeds are at a susceptible stage.	
Seedling alfalfa	Apply at 3 - 6 trifoliate stage.	
Seedling clover: wild white, dutch white, Ladino, alsike and red clovers	Apply after primary or spade leaf stage to fourth-true-leaf stage. Companion crop: wheat, oats, barley.	
Seedling grasses: seedling smooth bromegrass, meadow bromegrass, altai fescue, creeping red fescue, meadow fescue, tall fescue, altai wild ryegrass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, tall wheatgrass, slender wheatgrass, streambank wheatgrass, northern wheatgrass, western wheatgrass, green needlegrass, reed canary grass	Apply at the 2 - 4 leaf stage of crop.	

Weeds, Rates and Staging

Weeds controlled in seedling stage at 1.11 L/acre.

- ball mustard
- lamb's-quarters
- stinkweed
- wild mustard
- wormseed mustard

Weeds controlled at 1.72 L/acre in seedling stage unless otherwise noted.

- annual sow thistle*
- bull thistle (rosette to early bud)
- buttercup (tall and creeping when rapidly growing**
- Canada thistle (15 cm to early bud)
- curled dock (rosette)
- field bindweed (spring-rapid growth)**
- field horsetail (15 cm tall)**
- hemp nettle*
- perennial sow thistle (rosette)**
- plantain (rosette)
- ragweed
- redroot pigweed
- shepherd's-purse
- volunteer canola
- wild radish*

* Suppression only ** Top growth control only

Application Information

With: Apply with ground sprayers only. Do not apply by air. **Water Volume**: 60 - 80 L/acre.

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Tropotox Plus/Clovitox Plus/Topside (cont'd)

Application Tips
Spray in warm weather when plants are actively growing. Peas: Spray when growing conditions are good and the peas are not under stress from drought or disease. Seedling alfalfa: Alfalfa vigour may be reduced in the year of treatment; however, the crop recovers and yield will not be affected.

How it Works
A systemic, absorbed by leaves and stems and translocated to actively growing regions. It disrupts cell division, stops cell growth and interferes with respiration and food reserves. Selectivity based on ability of plant to efficiently convert MCPB to MCPA.

Expected Results
Broadleaf weeds should be dead within 2 - 3 weeks of treatment. Poor results and/or crop injury may be expected if Water volume is incorrect or weeds are too mature.

Restrictions
Rainfall: Rainfall before the foliage has dried from the spraying may decrease activity. **Grazing**: Seedling forage grasses: Do not graze the treated crop or cut for hay in the year of establishment. All other crops: Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest for forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping**: None.

Environmental Precautions
Toxic to aquatic organisms and non-target terrestrial plants.

Toxicity
High acute mammalian toxicity. Acute oral LD_{50} (rats) = 500 mg/kg. Non-toxic to bees. Intake can cause convulsions and coma. Can cause burns to the skin and eyes.

Storage
Store in a heated area.

Truvist

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Truvist (PCP# 30920)	Bayer CropScience	Aminocyclopyrachlor: 39.5% Chlorsulfuron: 15.8%	Wettable granule	567 gram

Crops, Staging and Rates
Industrial Non-Crop Areas - rights of way, roadsides, industrial sites, fence lines, and other non-crop areas.
Rate: 68 g/acre + non-ionic adjuvant at 0.25% v/v or Merge or Crop Oil Conc. at 1.0% v/v

Species	Weed Claim
Bluebur, buttercup (hairy, small-flowered), Canada thistle, common chickweed, common groundsel, yarrow, corn spurry, cow cockle, dandelion, fleabane (Canada, annual), flixweed, green smartweed, halogeton, hawkweed (orange, yellow), hemp nettle, knapweed (spotted, diffuse), knotweed, kochia, lady's thumb, lamb's quarters, leafy spurge, nodding thistle, ox-eye daisy, pasture sage, prickly lettuce, ragweed, redroot pigweed, Russian thistle (up to 8 cm), sow thistle (annual and perennial), smooth bedstraw, stinkweed, stork's bill, volunteer canola, white cockle, wild buckwheat, wild carrot, wild mustard, wild parsnip, yellow star thistle	Control

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Species	Weed Claim
Bladder campion, common tansy, field horsetail, perennial peppergrass, poison ivy, skeletonweed, sumac (smooth and staghorn)	12 month control
Buttercup (tall, giant, bulbous), field bindweed, giant hogweed (up to 4 leaf), goldenrod (Canada, common), plantain species, western ragweed,white and yellow sweetclover, wild chervil, wild rose	Season-long control
Kudzu, western snowberry	Suppression
Willow species (pussy, sandbar, ditchbank)	12 months suppression

Application Information

Ground: minimum spray volume of 81 L/acre. Maximum of one application of DuPont Truvist herbicide per year. Do NOT apply by air.

Application Tips

Truvist herbicide controls susceptible annual weeds by both foliar and root uptake. Best control of emerged annual weeds is obtained when weeds are actively growing, typically June-July. Warm, moist growing conditions promote active weed growth and enhance the activity of Truvist. Weeds stressed by moisture or temperature extremes may be less susceptible, and incomplete weed kill may result. Residual control of weeds germinating after spray application is achieved when Truvist is carried into the root zone by rainfall. For best results, sufficient rainfall to move Truvist 5 to 7 cm deep into the soil is required after application, before weeds develop an established root system and grow beyond the seedling stage.

How it Works

The most noticeable symptom is a bending and twisting of stems and leaves. Other advanced symptoms include severe necrosis, stem thickening, growth stunting, leaf crinkling, calloused stems and leaf veins, leaf cupping and enlarged roots. Death of treated broadleaf plants may require several more weeks and up to several months for some woody plant species.

Restrictions

Do not graze or feed forage, hay or straw from treated areas to livestock. Do not use plant material treated with this product for mulch or compost. Avoid application of this product in areas where the roots of desirable trees and/or shrubs may extend unless injury or loss can be tolerated. Do not use on lawns or turf. If non-crop sites treated with Truvist are to be converted to a food, feed, or fiber agricultural crop, or to a horticultural crop, a field bioassay should be completed before planting the desired crop. Caution is advised when using this product in areas where loss of desirable conifer or deciduous trees and/or shrubs as well as other broadleaf plants, including but not limited to, legumes and wild flowers, cannot be tolerated. Low rates of DuPont Truvist Herbicide can kill or severely injure most crops. Follow the sprayer cleanup section to avoid potential crop damage.

Environmental Precautions

Observe buffer zones specified under DIRECTIONS FOR USE on the Truvist label.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg. TOXIC to aquatic organisms and non-target terrestrial plants including coniferous and deciduous trees.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed.

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Tundra

Group 1, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tundra (PCP# 29367)	Bayer CropScience	Pyrasulfotole: 15.5 g/L	Emulsifiable concentrate	8.1 L, 129.6 L, 405 L
		Fenoxaprop-p-ethyl: 46 g/L	Emulsifiable concentrate	
		Bromoxynil: 87.5 g/L	Emulsifiable concentrate	

8.1 L jug will do 10 acres

Crops, Staging and Rates

Crops	Staging	Rate
Barley, spring wheat (including durum)	1 - 6 leaf on main stem plus 3 tillers	810 mL/acre

Weeds and Staging

Apply at 1 - 6 leaf stage unless otherwise noted.

Grassy Weeds: 1 to 6 leaves, up to emergence of the 3rd tiller

barnyard grass
green foxtail
wild oats
yellow foxtail

Broadleaf Weeds: Unless otherwise stated, 1 - 6 leaf stage

annual sow-thistle
Canada thistle (suppression, up to 30 cm in height)
Canada fleabane (10 cm high or diameter)[1,4,5]
chickweed[2]
cleavers[1,2] (1 - 6 whorl)
common ragweed
dandelion[3] (suppression, up to 10 cm in height and 25 cm in diameter)
flixweed (up to 10 cm in height)
hemp-nettle
kochia[2] (up to 10 cm in height)
lamb's-quarters
narrow-leaved hawk's beard (up to 10 cm, prior to bolting)
pale smartweed
perennial sow-thistle (suppression)
redroot pigweed
round-leaved mallow (suppression)
Russian thistle (up to 10 cm in height)
shepherd's-purse
stork's-bill: only in tank mix with 2,4-D and AMS (1 to 6-leaf)
stinkweed
volunteer canola (all types)
wild buckwheat
wild mustard

[1] For control of cleavers at the 4 to 6-whorl growth stage and control of Canada fleabane, add ammonium sulphate at 202 g/acre (99%) or 0.4 L/acre (49% solution) or 0.5 L/ace (40% solution). If using an ammonium sulphate product with a different concentration, adjust the rate accordingly. [2] Including Group 2 and 4 resistant biotypes. [3] Includes seedlings and overwintered rosettes. [4] Including glyphosate resistant biotypes. [5] Remove established Canada fleabane plants prior to planting via tillage or pre-seed burn-off.

Registered Tank Mixes

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (including durum), and barley		
2,4-D ester + AMS	280 g ae/ha + 0.5 L/ac (40% solution)	Weeds controlled by Tundra alone plus stork's-bill from the 1-6 leaf stage. Spring, durum wheat and barley may be treated from the 4-leaf to 6-leaf stage on main stem plus 3 tillers.

Temporary crop injury may be observed when AMS is included for enhanced broadleaf weed control.

Bayer CropScience supports the following mixes that are not on the Tundra label. These are MCPA ester, Lontrel, Decis and Sevin XLR, all on spring and durum wheat and barley; Tilt on spring wheat and barley. Apply mixes according to the most restrictive use limitations for either product.

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Application Information

How to Apply: Ground and air. Apply only once per season. **Water Volume**: 19 L/acre ground, 11.7L/acre air

Mixing Instructions

Fill the spray tank ¼ to ½ full with clean water and begin agitation. If mixing with AMS, add to the tank first. Add the appropriate amount of Tundra herbicide. Fill the spray tank with the balance of water required. Maintain sufficient agitation throughout mixing and application.

Application Tips

Use higher water volumes under conditions of heavy crop or weed canopies. For best results apply to young, actively growing weeds. Under cool, dry conditions, activity may be reduced or delayed. Activity may be affected if weeds are dust covered or covered in heavy dew, mist or rain. Do not apply to a stressed crop but apply after plants resume normal growth.

How it Works

Tundra is composed of 3 herbicides active ingredients, fenoxaprop-p-ethyl, bromoxynil and pyrasulfotole. Fenoxaprop-p-ethyl works by contact and systemically. It moves to the roots and shoots and kills the growing point. Pyrasulfotole is also systemic, inhibiting plant pigment formation and photosynthesis. Bromoxynil is a contact herbicide, inhibiting respiration and photosynthesis.

Expected Results

Typical symptoms include broadleaf weeds turning brown and dying within 3 - 5 days, reduced grassy leaf growth and chlorotic bleaching within 3 days of application followed by leaf chlorosis and complete death by 2 - 3 weeks and leaf bleaching.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce effectiveness. **Grazing**: Do not graze or cut the treated crop for hay within 25 days of application. **Pre-harvest Intervals**: Leave at least 65 days from application to harvest. **Re-cropping**: Alfalfa, barley, canary seed, canola, flax, (including low linolenic acid varieties) field peas*, lentils, oats, spring wheat including durum, potatoes and sunflowers may be planted 10 months after application. Lentils can be grown 22 months after application. Use a field bioassay for crops not listed above.

*Field peas may be grown the year following Infinity application in all Black, Gray Wooded and Dark Brown soil zones. Do not plant field peas the year following Infinity application in the Brown soil zone where organic matter content is less than 2.5% and soil pH is above 7.8. Use a field bioassay for crops not listed above.

Environmental Precautions

Tundra is toxic to aquatic organisms and non-target terrestrial plants. Leave at least a 15 metre buffer zone around sensitive terrestrial and aquatic habitats.

Toxicity

Toxic to aquatic organisms and sensitive terrestrial plants. Use of a hand-held backpack sprayer, inter-row broadcast sprayer, spot treatment, soil drench and soil incorporation require no buffer zones. Otherwise, use recommended buffer zones of 3 - 10 metres when using ground application, 1 - 175 metres by air.

Storage

Store in a heated shed. Do not freeze.

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UpBeet

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
UpBeet (PCP# 36813)	E.I.duPont Canada	Trifloxysulfuron-methyl 10%	Dry flowable	113 grams

Crops, Staging and Rates

Crops	Staging	Rate
Sugar beet	Apply any time after planting and after weeds have emerged.	UpBeet 14 - 28 grams + surfactant 0.25% v/v

Weeds and Staging

UpBeet + non-ionic surfactant: *Volunteer*

Registered Tank Mixes

Apply when weeds are in cotyledons to 4 leaf stage, approximately 5 cm tall or across.

Tank mix partner	Tank mix rate	Additional weeds controlled
Betanex*	UpBeet 14 - 28 grams + Betanex 2.2 - 3.4 L/acre. Note: Do not add surfactant to this tank mixture.	Green foxtail (suppression), kochia (rosette stage - 2.5 cm in diameter), redroot pigweed, lamb's quarters

* Make two sequential applications. The total grams of product applied must not exceed 40 grams per growing season.

Application Information

How to Apply: Ground equipment only. Do not apply by air. Do not apply through any type of irrigation equipment.
Water Volume: Minimum of 40 L/acre.

Mixing Instructions

Use mixing instructions "B" on page 13.

Application Tips

Applications should be made 7 - 10 days apart or as weeds germinate. Weeds should be actively growing and not under stress. For best results, apply to small, emerged weeds between the cotyledon and 4 true leaf stage at approximately 5 cm tall or across. Applications made to larger weeds or to weeds under stress may result in unsatisfactory control. Since UpBeet has little or no soil activity, only weeds that have emerged above the soil surface will be controlled. Use sequential tank mix applications to control new weed flushes. Timely cultivations can be used in addition to UpBeet tank mixes for optimum weed control in a sugar beet management program. Dry, dusty field conditions may reduce weed control in wheel track areas. Higher water volumes may improve control in these conditions.

How it Works

Absorbed through foliage. Inhibits cell elongation.

Expected Results

UpBeet herbicide rapidly stops the growth of susceptible weeds, weeds turn yellow usually 7 - 21 days after post-emergent applications, followed by the death of the growing plant. Cool and/or dry conditions may reduce or delay herbicidal activity. Large weeds or weeds stressed due to frost, drought or water-saturated soil, disease or insect damage may not be controlled adequately.

Restrictions

Rainfall: Rainfall within 6 hours may reduce weed control. **Crop Rotation:** No restrictions on planting or tilling of crop rotation to livestock. **Pre-harvest Interval:** Do not apply within 60 days of harvest. **Cropping Restrictions:** Do not

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barrow within 60 days of treatment. In case of crop failure, only sugar beets may be replanted 30 days after application of Cyflufen. However, if a total of 100 g/ha of Cyflufen has already been applied to the first crop of sugar beets, then no more Cyflufen may be applied to the second crop of sugar beets. Cereal crops (spring wheat, durum wheat, winter wheat, barley) may be planted the following year after application of Cyflufen. For all other crops, a field trial must be conducted.

Environmental Precautions

Do not contaminate water bodies by cleaning directly in water or in areas where surface water is present, or through wash water.

Toxicity

Very low toxicity by ingestion. Acute oral LD_{50} (rats) > 5,000 mg/kg. Low toxicity by inhalation.

Valtera/Chateau

Group 14

Formulations

Product	Company	Active ingredient	Concentration	Guarantee date
Valtera/Chateau (PCP# 29221)	Adama Canada (distributed by Nufarm Agriculture)	Flumioxazin 51.1%	500G	1.0 kg, 4 x 2.27 kg

Crops, Staging and Rates – Pre-emergence

Crop	Staging (Latest Growth Stage)	Rate
Peas (Chateau)	After rolling for the pre-emergence suppression of seedling weeds	All grains (coarse and medium textured), until < 4% organic matter
Alfalfa, Field pea, soybean, chickpea and spring wheat (not durum), field corn	Fall application prior to ground freeze. Do not apply on top of snow. Spring application: field pea, chickpea, soybean – apply up to a maximum of 3 days after seeding. Do not apply after ground crack. Spring wheat – apply a minimum 7 days before seeding.	All coarse-coarse-texture, < 4% O.M.; All grains (medium texture, < 4% O.M.)
Desiccation on dry beans	Desiccation over apply after 50% leathery pod stage or after 50% leaf drop	All grains desiccation use. Desiccation use pattern only requires the addition of Nufarm Entrance 480S at 0.4% v/v

Do not apply on soils with greater than 4% organic matter (O.M.). For fall applications, crop being seeded the following year must be "No till" or minimum disturbance. Any tillage or soil disturbance after a fall/fall application can reduce residual weed control.

Weeds and Staging

Canada thistle
chickweed
common ragweed*
common ragweed*
dandelion
eastern black nightshade*
green foxtail suppression with Valtera*
green pigweed*
hairy nightshade*
kochia (incl. the S and R etc.)
redroot pigweed*
volunteer canola suppression

*Suppression only with Chateau or combine.

Registered Tank Mixes

Tank mix partner	Product rates
glyphosate product, present as isopropyl amine or potassium salt	1 litre, 360 grams glyphosate

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Wrangler/WMD 480

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Brakes, Wheels and Tires

Dimensions, Weights and Capacities

Body, Cab and Exterior

Interior, Instrumentation and Controls

Lighting, Electrical and Accessories

Miscellaneous, Regulatory and Optional

Application Information

Application Tips

Data Collection

Required Records

Restrictions

Environmental Prerequisites

Security

Storage

Coding

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Image - Imaging and Forms

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Tank mix partner	Starane plus tank mix partner rate	Crop stage/comments
Triasper	Starane 2.0 L/acre + Triasper 3.9 L/acre	Apply either in fall or spring when the majority of plants have 4 leaves to full tillering but prior to presence of first node (jointing)

Nozzle Comparisons supports the following nozzle that you can use for Starane labels: Turbo and Ultra (X) on broom wheat; AgroCID on winter wheat; Turbo and Accelerator on spring wheat; XLT Fan XL, Barricade, Raten (S) and Prestige (X) on spring and broom wheat; TX on spring and winter wheat on broom. Apply nozzle according to the most restrictive use limitations for either product.

Rate

Starane 0.2 L/acre

Application Information

How to Apply: Apply with ground equipment or by air. **Water Volume:** Ground: minimum of 18.9 L/acre. Air: minimum of 10.1 L/acre.

Application Tips

Do not apply to crop that is under stress due to abnormal environmental conditions such as frost, extreme heat, low fertility, drought, flooding or disease and/or insect damage as crop injury may result. Under DROUGHT conditions: Do not spray. Same if time between seeding and spraying exceeds 35 days as (drought hastens crop development). Do not spray Same three days prior to or following cold temperatures (7°C or lower). Do not apply to crops undescribed in legumes. Apply only once per season.

Do not use Same if another Group 2 grass herbicide has been previously applied in the same season. For best results, apply to emerged, young, actively growing weeds. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain.

How it Works

Same Thifensulfuron-methyl 1 (picks is primarily via foliage and is transported to acute or new shoot growth where it inhibits the enzyme acetolactate synthase (ALS). Inhibition of this enzyme prevents protein production, which leads to gradual death of target weeds.

Expected Results

Growth of susceptible plants stops rapidly, and after a few days, plants develop chlorotic discolouration on the leaves, which sometimes turn red. Complete control may take two to four weeks.

Restrictions

Rainfall: Rainfall within 6 hours of application may reduce effectiveness. **Cropping** restrictions: Do not graze the treated crop or cut for forage within 7 days or cut for hay within 30 days after application. **Pre-harvest Interval:** Do not harvest spring or durum wheat for grain or straw within 60 days of application. Do not harvest winter wheat for grain or straw within 75 days of application. **Re-cropping:** The following crops can be planted 10 months after application: alfalfa, barley, canary seed, field corn, canola, chickpeas, dry bean, flax (including low linolenic acid varieties), lentils, mustard, oats, field peas, soybeans, sunflowers, timothy, wheat (spring, durum and winter). Use a field bioassay for crops not listed above.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones of 1 metre with ground application.

Toxicity

Moderately toxic by ingestion. Acute oral LD_{50} (rats) = > 2,000 mg/kg. Moderate skin and eye irritation.

Storage

Store in a cool, dry place. Do not store below freezing. Shake well before using.

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Velocity m3 All-In-One

Group 2, 6, 27

Formulation

Velocity m3 co-package contains:

Product	Company	Active ingredient	Formulation	Container size
Velocity m3 All-In-One (PCP# 29580)	Bayer CropScience	Thiencarbazone-methyl: 9 g/L Pyrasulfotole: 21.3 g/L Bromoxynil: 175 g/L	Suspension	6 L jug, 129.6 L

One 6 L jug of Velocity m3 All-In-One will treat 20 acres.

Crop, Staging and Rates

Crop	Staging	Rate
Spring and durum wheat	1 - 6 leaves on main stem, plus 3 tillers but prior to presence of first node (jointing).	Velocity m3 All-In-One: 0.4 L/acre
Winter wheat	Apply either in fall or spring when the majority of plants have one leaf to full tillering but prior to presence of first node (jointing).	

Weeds and Staging

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control.

Grassy Weeds: Apply at 1 to 6 leaves, up to emergence of the 3rd tiller

barnyard grass
volunteer canary seed (1 - 6 leaf, up to emergence of 2nd tiller)
green foxtail
Japanese brome (suppression) (1 - 6 leaf)
Persian darnel (suppression)
yellow foxtail (suppression) 1 - 6 leaf
wild oats[2]

Broadleaf Weeds: Unless otherwise stated, apply at 1 - 6 leaf stage

annual sow-thistle
Canada thistle (suppression) (up to 30 cm in height)
Canada fleabane (10 cm high or diameter)[3,4]
chickweed
cleavers[1,2]
common ragweed
dandelions[2] (suppression) (up to 10 cm in height and 25 cm in diameter)
flixweed (up to 10 cm in height)
hemp-nettle
giant ragweed (suppression)[2,4]
kochia[1] (up to 10 cm in height)
lamb's quarters
narrow-leaved hawk's beard (up to 10 cm and prior to bolting)
pale smartweed
perennial sow-thistle (suppression)
redroot pigweed
round-leaved mallow
Russian thistle (up to 10 cm in height)
shepherd's purse
stinkweed
stork's bill: only in tank mix with 2,4-D and MMS (1 - 6 leaf)
volunteer canola (all types)
wild buckwheat
wild mustard

[1]In spring wheat only. For improved and more consistent control of wild oat in areas of heavy infestation, Group 2 resistant observers at the 4 to 6 shoot growth stage, improved control of large kochia and Japanese brome, and suppression of Canada thistle and dandelion in advanced staging or cool temperatures, add ammonium sulphate at 2% (2 g/acre (28% solution), 0.5 L/acre (40% solution) or 0.4 L/acre (49% solution) to the tank before adding other components. [2]Including Group 2 and 9 resistant biotypes. [3]Includes seedlings and overwintered rosettes. [4]Including glyphosate resistant biotypes. [5]Remove established Canada fleabane plants prior to planting via tillage or pre-seed burn-off.

Glyphosate-tolerant: For more consistent weed control, add a non-ionic surfactant (Agral 90, AgSurf or Surf 92) at 0.25% v/v.

Registered Tank Mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled and comments
Spring wheat		
2,4-D ester + MCPA	280 g ae/ha + 0.5 L/ac (40% solution)	Weeds controlled by Velocity M3 All-In-One alone plus stork's bill from the 1-6 leaf stage. Spring wheat 4 leaf to 6 leaf stage on main stem plus 3 tillers but prior to presence of first node (jointing).

Bayer CropScience supports the following mixes that are not on the Velocity m3 label: MCPA ester on spring, durum and winter wheat; Lontrel, Decis and Decis XLR on spring and durum wheat; Tilt on spring and winter wheat. Apply mixes according to the most restrictive use limitations for either product.

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Velocity m3 All-in-One (cont'd)

Application Information

How to Apply: Apply with ground equipment or by air. **Water Volume**: Ground: minimum of 18.9 L/acre. Air: minimum of 11.3 L/acre.

Application Tips

Under DROUGHT conditions - Do not spray Velocity M3 if time between seeding and spraying exceeds 35 days as (drought hastens crop development). Do not spray Velocity M3 three days prior to or following cold temperatures (3°C or lower) Do not apply to crops underseeded to legumes. Do not use Velocity m3 if another Group 2 grass herbicide has been previously applied in the same season. For best results, apply to emerged, young, actively growing weeds. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain. Do not apply to crop that is under stress due to abnormal environmental conditions such as frost, extreme heat, low fertility, drought, flooding or disease and/or insect damage as crop injury may result. Apply only once per season.

How it Works

Thiencarbazone-methyl: Uptake is primarily via foliage and is transported to areas on new shoot growth where it inhibits the enzyme acetolactate synthase (ALS). Inhibition of this enzyme prevents protein production, which leads to gradual death of target weeds.

Pyrasulfotole: Absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis. Bromoxynil: Works on contact, interfering with photosynthesis, disrupting plant growth, which ultimately leads to the plant's death.

Expected Results

Grass weeds: Growth of susceptible plants stops rapidly, and after a few days plants, develop chlorotic discolouration on the leaves, which sometimes turn red. Complete control may take two to four weeks.

Broadleaf weeds: Small burnt spots on leaf can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway resulting in bleaching symptoms and rapid death, normally in 6 - 14 days.

Restrictions

Rainfall: Rainfall within 60 minutes of application may reduce effectiveness. **Grazing** restrictions: Do not graze the treated crop or cut for forage within 25 days or cut for hay within 30 days of application. **Pre-harvest Intervals**: Do not harvest spring or durum wheat for grain or straw within 60 days of application. Do not harvest winter wheat for grain or straw within 72 days of application. **Re-cropping**: The following crops can be planted 10 months after application: alfalfa, barley, canary seed, canola, flax (including low linolenic acid varieties), field peas*, oats, spring and durum wheat, and sunflowers. The following crops can be planted 22 months after application: lentils. Use a field bioassay for crops not listed above.

*Field peas may be grown the year following Velocity m3 application in all Black, Gray Wooded and Dark Brown soil zones. DO NOT plant field peas the year following a Velocity m3 application in the Brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5.

Environmental Precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones of 1 - 5 metres with ground application.

Toxicity

Moderately toxic by ingestion. Acute oral LD_{50} (rats) = > 2,000 mg/kg. Slightly toxic by contact. Moderate skin and eye irritation.

Storage

Store in a cool, dry place. Do not store below freezing.

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Velpar DF CU

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Velpar DF CU (PCP# 25225)	Tessenderlo Kerley	Hexazinone: 75%	Water dispersible granule	2 kg bag

Crops, Staging and Rates

Rate: Alfalfa - Velpar DF: 272 - 544 g/acre

Crop	Timing
Established, grown for seed alfalfa, forage alfalfa	Apply in late fall or early spring when alfalfa is dormant. It must be seed or forage alfalfa established for at least 18 months.

Weeds and Staging

In alfalfa

dandelion
narrow-leaved hawk'sbeard (high rate)
quackgrass
scentless chamomile (high rate)
sow thistle

Check label for weeds controlled by Velpar in non-crop areas.

Application Information

How to Apply: Apply with ground equipment only. Do not apply by air. **Water Volume**: 81 L/acre.

Application Tips

Do not apply to frozen soils or soils with less than 1% soil organic matter. Do not use on fields that will be seeded to other crops within 24 months of application. Do not apply to slopes as soil erosion may occur. Best results are obtained when Velpar is present in the root zone during active growth of the target vegetation. Symptoms usually appear in herbaceous plants within 2 weeks after application under warm, humid conditions, while 4 to 6 weeks may be required when weather is cool. If rainfall after application is inadequate to activate Velpar in the soil, plants may recover from contact effects and continue to grow until sufficient rainfall moves Velpar into the root zone.

How it Works

A systemic herbicide readily absorbed through the roots and foliage and translocated upwards. Inhibits photosynthesis.

Restrictions

Rainfall: Rainfall is beneficial for activation of product. **Grazing**: Do not apply within 30 days of harvest (cutting for hay) or feeding of forage or grazing. **Re-cropping**: Information enabling specific recommendations for rotational crops and re-cropping intervals is limited. Do not seed any crop following alfalfa that has been treated with Velpar L herbicide until a successful field bioassay shows that the crop in question may be grown safely. A successful field bioassay means growing to maturity a test strip of the crop across the field.

Environmental Precautions

Apply with a 1 metre buffer between aquatic habitats and a 5 metre buffer between sensitive terrestrial habitats and the treated area.

Toxicity

Low acute mammalian toxicity. Acute oral LD_{50} (rats) = technical 1,690 mg/kg. May cause some eye irritation. Slightly toxic to fish.

Storage

Store in a cool, dry place. Keep away from heat, sparks and open flame.

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Viper ADV

Group 2, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Viper ADV (PCP# 30626)	BASF Canada	Imazamox: 20 g/L Bentazon: 429 g/L	Solution	2 x 8.1 L bulk container 129 L
UAN (28-0-0)*		UAN: 28%	Liquid	

One case treats 40 acres. 2 cases of UAN are required per 1 case of Viper. *BASF 28% UAN is required and sold separately.

Crops, Staging and Rates

Crop	Staging	Rate
Field peas	3 - 6 above ground nodes.	Viper ADV: 0.404 L/acre + 0.81 L/acre UAN
Dry edible beans*	After first trifoliate leaf has fully expanded up to 2nd trifoliate leaf.	Viper ADV 0.404 L/acre + 0.145 L/acre Basagran Forte + 0.81 L/acre UAN (28%)
Soybean	Cotyledon – 4 leaf stage	Viper ADV: 0.404 L/acre + 0.81 L/acre UAN

*Dry beans require a tank mix with additional Basagran Forte. Note: Temporary crop yellowing may be observed shortly after application.

Weeds and Staging

Grassy weeds: 1 - 4 main leaves or until early tillering.

barnyard grass
green foxtail
Japanese brome*
Persian darnel
volunteer barley
volunteer canaryseed
volunteer tame oats
volunteer wheat (excluding CLEARFIELD wheat)
wild oats
yellow foxtail

Broadleaf weeds: Cotyledons to 4 leaf stage.

annual sowthistle*
cleavers*
cow cockle
green smartweed
kochia* (including Group 2 resistant biotypes)
lamb's-quarters
perennial sowthistle*
redroot pigweed
round-leaved mallow*
Russian thistle
shepherd's-purse
stinkweed
volunteer canola (all types)
wild buckwheat*
wild mustard (including Group 2 resistant biotypes

* Suppression only.

BASF 28 % UAN: 0.81 L/acre. BASF 28% UAN (sold separately) must be used with Viper at 0.81 L/acre.

Application Information

How to Apply: Apply with ground equipment only. Do not apply by air. **Water Volume**: 40 L/acre.

Mixing Instructions

Use mixing instructions "b" on page 13.

Application Tips

If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Viper ADV if temperatures of +5°C or lower are forecasted within 3 days of application. Cold temperatures near freezing will negatively affect herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield. Apply Viper ADV when broadleaf weeds are small and actively growing and before weeds reach the maximum size recommended for control. DO NOT apply VIPER ADV Herbicide to field peas that have been subjected to stress from conditions such as hail damage, flooding, drought, hot, humid weather, widely fluctuating temperature conditions, prolonged cold weather or injury from prior herbicide applications, as crop injury may result.

Failure to include UAN will result in significantly reduced product performance.

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How it Works

Imazamox is a systemic herbicide absorbed by foliage and roots that disrupts plant metabolism causing growth to stop. Bentazon is a contact herbicide taken up primarily through the leaves and interferes with photosynthesis. Thorough coverage of foliage is important for consistent weed control.

Restrictions

Rainfall: Rainfall within 6 hours of application may reduce activity. **Grazing**: Do not graze treated field peas or cut for feed within 20 days of application. **Pre-harvest Intervals**: Do not apply within 60 days of harvest. **Re-cropping**: Winter wheat may be seeded 3 months after application. Canary seed, CLEARFIELD canola, non-CLEARFIELD canola, chickpea, field corn, field pea, flax, lentil, oat, barley and spring wheat (including durum), CLEARFIELD sunflowers and sunflowers may be seeded the first spring after application and tame mustard the second season after application. A field bioassay (a test strip grown to maturity) is recommended the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals (1-877-371-2273).

Do not apply Viper ADV more than once per year.

Environmental Precautions

Viper tank mixture is highly toxic to non-target plants. Observe buffer zones specified under Directions for Use.

Toxicity

Viper ADV components: Imazamox - very low toxicity by ingestion. Acute oral LD_{50} (rats) = > 5,000 mg/kg. Low toxicity by contact. Bentazon - moderately toxic by ingestion. Acute oral LD_{50} (rats) = > 1,089 mg/kg. Moderately toxic by contact.

Storage

Do not freeze. Store in a cool, dry place above 5°C.

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Herbicide Selector Chart – Cereals

Crop	American Nightshade	Annual Smartweed/Lady's Thumb			Annual Sow-thistle	
Barley	Buctril M[6] Enforcer M Koril Pardner[6] Thumper[6] Titanium	2,4-D Ally[6] Attain XC[6] Axial iPak Banvel II[6] Barricade Broadband Buctril M[6] Curtail M Deploy[6] Distinct[5] DyVel	DyVel DSp Embutox[1,6] Enforcer M Estaprop[6] Express FX[5] Frontline XL[6] Lorox + MCPA[6] MCPA[7] (all forms) OcTTain XL Pardner[6] Paradigm Pixxaro[7]	Prestige XC Priority[6,9] Refine SG Sencor Spectrum Target[6] Thumper[6] Titanium Travallas Trophy[1,6]	2,4-D[7] Ally[1,6] Attain XC[1,6] Axial Ipak[1] Broadband[7] Curtail M DyVel DSp Estaprop[6] Frontline XL[6] Goldwing[6,1] Infinity MCPA[7] (all forms)	OcTTain XL[7] Paradigm[7] Prestige XC Priority[6,1,9] Refine M[7] Retain[7] Spectrum Target[6] Triton C Tropotox Plus[1,6] Tundra
Wheat (C - CLEARFIELD wheat)	Buctril M[6] Enforcer M Pardner[6] Thumper[6] Titanium	2,4-D Ally[6] Attain XC[6] Axial iPak Banvel II[6] Barricade Basagran[6] Broadband Buctril M[6] Curtail M Deploy[6] Distinct[5] DyVel DyVel DSp Embutox[1,6]	Enforcer M Estaprop[6] Everest Everest GBX Express FX[5] Frontline 2,4-D Frontline XL[6] Harmony K[7] Harmony Max[6] Harmony SG MCPA[7] (all forms) OcTTain XL Pardner[6] Paradigm Pixxaro[7]	Predicade Prestige XC Priority[6,9] Refine SG Sencor Simplicity Spectrum Tandem Target[6] Thumper[6] Titanium Travallas Trophy[1,6] Varro	2,4-D Ally[6,1] Attain XC[6,1] Broadband[7] Curtail M DyVel DSp Estaprop[6] Frontline XL[6,1] Frontline 2,4-DXC Harmony Max[1,6] Goldwing[6,1] Infinity MCPA[7] (all forms)	OcTTain XL[7] Paradigm[7] Prestige XC Priority[6,1,9] Refine M[7] Retain[7] Spectrum Target[6] Triton C Tropotox Plus[1,6] Tundra Velocity m3
Oats	Buctril M[6] Pardner[6]	Banvel II[6] Buctril M[6] Curtail M Deploy[6] DyVel Distinct[5]	Embutox[1,6] Frontline XL[6] Lorox + MCPA[6] MCPA[7] (all forms) Pardner[6] Prestige XC	Priority[6,9] Refine SG Spectrum Target[6]	Curtail M Frontline XL[6,1] Goldwing[6,1] MCPA[7] (all forms) Refine M[7]	Spectrum Prestige XC Priority[6,1,9] Target[6] Tropotox Plus[1,6]
Fall Rye (spring application)	Buctril M[6] Pardner[6]	2,4-D Buctril M[6]	MCPA[7] (all forms) Pardner[6]		2,4-D[7] Goldwing[6,1]	MCPA[7] (all forms) Tropotox Plus[1,6]
Triticale	Pardner[6]	Distinct[5]	Pardner[6]		Goldwing[6,1]	Infinity

[6] Other similar products can be found listed under this product.
[1] Suppression only
[7] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] Pressed treatment

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Herbicide Selector Chart – Cereals

Crop	Barnyard Grass	Bladder	Canada Thistle			
Barley	Avadex Avadex Plus Broadband Liquid Achieve SC* Puma* Titanium	2,4-D Ally* Attain XC* Buctril M* Enforcer M Estapyng* MCPA (all forms) OnTTack XL Pardner* Thumper* Tilanium Tolfusate* Tundra	Ally*[1] Attain XC*[1] Avadex Plus[1] Barricade[1] Banvel II* Barricade[1] Buctril M* Curtail M Deploy*[1] Distinct[1,3] Dyvel	Dyvel DS[2] Embutox*[3] Enforcer D Enforcer M Estapyng[1,3] Express FX*[1] Express SG[1] Express Pro*[1] FirstStep Frontline XL*[1,3] Hot Trick	Infinity[1] Lontrel Lontrel + MCPA* MCPA (all forms) Mecoprop[2] Momentum[2] Nuance*[1] OnTTack XL[1] Optica Trio[1] Prestige XC Refine SX*	Refine SG[1] Rotain Spectrum Target*[1] Titanium[2] Travelled[2] Tribute Q[1] Tribute M[1] Trispotox Plus[1,3] Tundra[2]
Wheat (C - CLEARFIELD wheat)	Attitude FX (C) Avadex Avadex Plus Broadband Clever* Harmony Max* Horizon* Liquid Achieve SC* Predicade Puma* Tandem Titanium Traxos Traxos Twin Tundra Varro Velocity m2	2,4-D Ally* Attain XC* Buctril M* Enforcer M Estapyng* Frontline XL* MCPA (all forms) OnTTack XL Pardner* Thumper* Titanium Traxos Twin	2,4-D[2] Ally*[1] Attain XC*[1] Avadex Plus[1] Banvel*[1] Barricade[1] Bassagran[1,3] Buctril M* Curtail M Deploy*[1] Distinct[1,3] Dyvel Dyvel DS[2]	Embutox* Enforcer D Enforcer M Estapyng[1,3] Express FX*[1] Express SG[1] Express Pro*[1] FirstStep Frontline Frontline XL*[1] Harmony X[1] Harmony Max[1,3] Harmony SG[1]	Hot Trick Infinity[1] Lontrel Lontrel + MCPA[1,3] MCPA (all forms) Mecoprop[2] Momentum[2] Nuance*[1] OnTTack XL[1] Optica Trio[1] Paval Predicade[1] Prestige XC	Refine M[1,3] Refine SG[1] Rotain Simplicity[1] Spectrum Target[1,3] Titanium[2] Travelled[2] Tribute Q[1] Tribute M[1] Trispotox Plus[1,3] Tundra[2] Velocity m2[1]
Oats		Buctril M* MCPA (all forms) Pardner*	Banvel II*[3] Buctril M*[3] Curtail M Deploy[1,3] Distinct[1,3]	Dyvel Embutox* Frontline XL*[1] Lontrel Lontrel + MCPA*[3]	MCPA (all forms) Mecoprop[2] Optica Trio[1] Prestige XC[1]	Refine M[1,3] Refine SG[1] Spectrum Target*[1]
Fall Rye (spring application)	Liquid Achieve SC*	Buctril M* MCPA (all forms) Pardner*	Buctril M*[3] MCPA (all forms)	Trispotox Plus[1,3]		
Triticale		Pardner*	Distinct[1,3] Infinity[1]			

* Other similar products can be found listed under this product
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] Pressed treatment

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Herbicide Selector Chart – Cereals

Crop	Choosers		Common Clearwaters[1]		Common Broadleaf	
Barley	Atlantis 4C[2]	Optica Trio	Ally[2]	Optica Trio	Ally[2]	Prestige 4C
	Avoral Plus	Pixxaro	Atlantis 4C[2]	Pixxaro	Avoral Plus[2]	Refine SP
	Barricade	Pixxaro	Avoral Plus	Pixxaro	Curtail M	Refine SX
	Broadband	Prestige 4C	Barricade	Priority[2]	Daylite[2]	Relish
	Daylite[2]	Priority[2]	Broadband	Prestige 4C	Enforcer D	Spruce
	Dyfall	Pulsar	Daylite[2]	Refine SP	Enforcer M	Trumpet[2]
	Dyfall 22g	Refine SP[2]	Enforcer M	Refine SX	Lontrel	Titanium
	Enforcer D	Refine SX	Express Pro[2]	Relish	Pardner[2]	Triton C
	Enforcer M	Relish	Frontline XL[2]	Spruce		
	Frontline XL[2]	Spectrum	Hat Trick	Spectrum		
	Gothsung[2]	Stellar[2]	Infinity	Stellar[2]		
	Hat Trick	Target[2]	Kurfist[2]	Travalley		
	Hawk[2]	Travalley	Lonox + MCPA[2]	Triton C		
	Infinity	Triton C	Weraprop	Tundra		
	Weraprop	Trophy[2]	Zo'Titan 4C			
	Momentum	Tundra				
	Zo'Titan 4C					
Wheat (E - GUARDFIELD wheat)	Altitude FX (C)	Momentum	2,4-D	Zo'Titan 4C	2,4-D	Harmony XC
	Atlantis 4C[2]	Zo'Titan 4C	Ally[2]	Optica Trio	Ally[2]	Lontrel
	Avoral Plus	Optica Trio	Altitude FX (C)	Pixxaro	Bowgren[2,3]	Pardner[2]
	Banvel D[2]	Pixxaro	Atlantis 4C[2,3]	Pixxaro	Avoral Plus[2,3]	Prestige 4C
	Barricade	Pixxaro	Avoral Plus	Pixxaro	Curtail M	Refine SP
	Bowgren[2]	Predicade	Barricade	Predicade	Daylite[2]	Refresh
	Broadband	Prestige 4C	Bowgren[2,3]	Prestige 4C	Enforcer D	Relish
	Clever[2]	Priority[2,3]	Broadband	Priority[2,3]	Enforcer M	Spruce
	Daylite[2,3]	Pulsar	Daylite[2]	Refine SP	Harmony M	Trumpet[2]
	Dyfall	Refine SP[2,3]	Enforcer M	Refine SX	Harmony XFlex[2]	Titanium
	Dyfall 22g	Refine SX	Express Pro[2]	Relish		Triton C
	Enforcer D	Relish	Frontline XL[2]	Spruce		
	Enforcer M	Simplicity	Frontline 2,4-D	Simplicity		
	Everest 2000	Spectrum	Harmony M	Spectrum		
	Frontline XL[2]	Stellar[2]	Harmony XFlex[2]	Stellar[2]		
	Frontline 2,4-D	Tandem	Harmony XC	Tandem		
	Gothsung[2]	Target[2]	Hat Trick	Tracxis Tuxi		
	Harmony M[2]	Travalley	Infinity	Travalley		
	Harmony XFlex[2,3]	Tracxis Tuxi	Kurfist[2]	Triton C		
	Harmony XC	Triton C	Lonox + MCPA	Tundra		
	Hat Trick	Trophy[2]	Weraprop	Velocity m3		
	Hawk[2]	Tundra				
	InPOWy	Verte				
	Weraprop	Velocity m3				
Oats	Banvel D[2,3]	Optica Trio	Daylite[2]	Prestige 4C	Kurfist M[2]	Pardner[2]
	Daylite[2,3]	Prestige 4C	Enforcer M	Priority[2,3]	Curtail M	Prestige 4C
	Dyfall	Priority[2,3]	Frontline XL[2]	Refine SX	Daylite[2]	Refine SP
	Enforcer M	Refine SP[2,3]	Lonox + MCPA	Spectrum	Lontrel	Refine SX
	Frontline XL[2]	Refine SX	Weraprop	Stellar[2]		
	Gothsung[2]	Spectrum	Optica Trio			
	Hawk[2]	Stellar[2]				
	Weraprop	Target[2]				
Full flyer spring application	Gothsung[2]				Kurfist M[2] Pardner[2]	
Triticale	Enforcer M	Infinity	Infinity		Pardner[2]	
	Gothsung[2]					

1 Other similar products can be found listed under this product.
2 Suppression only.
3 All spring wheat except durum.
4 All spring wheats (including durum when tank mixed with 2,4-D ester).
5 See page 41 for resistance information.
6 Top growth control.
7 Spring rosettes only.
8 Registered on a limited number of varieties, refer to label.
9 To be used pre-seed or pre-emergence, as a mixture.

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Herbicide Selector Chart – Cereals

Crop	Grass Spring	Grass Cereals		Cleaning Reference	Broadleaf		Cleaver Reference
Barley	Atlantis[1] Attribute[1] Barnstorm[1] Hawker[1] Hurler Kerb Flow Lexus + Atlantis[1] Pinoxaden Refine Extra Refine Xtra Rotam Sekator Topgun Triton C	Alpha[1] Attribute Pro[1] Barnstorm[1] Duplosan KV Hawker[1] Hurler Kerb Flow Liberator Gold Express SX Express Pro[1] Express SX Frontline Hallmark[1] Lexus + Atlantis[1]	Sunfuryl[1] Sunfuryl[1] Pounce[1,2] Refine SX Refine XS Rotam Topgun[1] Tomahawk Tomcat<

Herbicide Selector Chart : Cucurbits

Crop	Weed				Area Control	
Barley	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Black nightshade*	Bur*	Common chickweed*	Mayweed*	Corn Poppy	Corn Spurrey*
	Fumitory*	Cleavers*	Common mallow*	Mouse-ear chickweed*	Groundsel	Field Pansy
	Shepherd's purse*	Cornflower*	Corn marigold*	Prickly lettuce*	Scentless Mayweed	Field Speedwell
	Wild oat*	Cow cockle	Corn spurrey*	Redshank*	Stinking Mayweed	Field Woundwort
	Wild radish*	Crane's-bill*	Corn volunteer	Scarlet pimpernel	Sun Spurge	Hedge Mustard
	Wild turnip*	Dead-nettle*	Cranesbill*	Shepherd's purse*	Thistle*	Henbit
	Willowherb*	Docks*	Field bindweed*	Smooth sowthistle*	Wild buckwheat	Knotgrass*
	Wireweed*	Fat hen	Field pansy	Spear thistle*	Wild radish*	Mallow*
		Field speedwell*	Field penny-cress	Spiny sowthistle*	Wild turnip*	Pineapple weed
		Fool's parsley	Field woundwort	Stinging nettle*	Willowherb*	Poppy*
		Forget-me-not*	Fumitory*	Sun spurge*	Wireweed*	Scarlet pimpernel
		Hedge mustard	Hemp-nettle*	Thistle*		Shepherd's purse*
		Henbit	Knotgrass*	Volunteer potato		Speedwell*
		Hop trefoil	Mallow*	Wild buckwheat		Stinking Mayweed
		Ivy-leaved speedwell	Mayweed*	Wild mustard		Thistle*
		Mayweed*	Nettle*	Wild radish*		Volunteer potato
		Nettle*	Pansy*	Wild turnip*		Wild buckwheat
		Pansy*	Parsley piert	Willowherb*		Wild mustard
		Parsley piert	Pepper-cress	Wireweed*		Wild radish*
		Pepper-cress	Pineapple weed			Wild turnip*
		Pineapple weed	Poppy*			Willowherb*
		Poppy*	Prickly lettuce*			Wireweed*
		Prickly lettuce*	Redshank*			
		Redshank*	Scarlet pimpernel			
		Scarlet pimpernel	Scentless Mayweed			
		Scentless Mayweed	Shepherd's purse*			
		Shepherd's purse*	Smooth sowthistle*			
		Smooth sowthistle*	Spear thistle*			
		Spear thistle*	Spiny sowthistle*			
		Spiny sowthistle*	Stinging nettle*			
		Stinging nettle*	Sun spurge*			
		Sun spurge*	Thistle*			
		Thistle*	Volunteer potato			
		Volunteer potato	Wild buckwheat			
		Wild buckwheat	Wild mustard			
		Wild mustard	Wild radish*			
		Wild radish*	Wild turnip*			
		Wild turnip*	Willowherb*			
		Willowherb*	Wireweed*			
		Wireweed*				
Oats	Fumitory*	Docks*	Cornflower*	Wild oat*	Corn Marigold*	
	Shepherd's purse*	Fumitory*	Hedge mustard	Wild radish*		
	Wild radish*	Hedge mustard	Mayweed*	Wild turnip*		
	Wild turnip*	Mayweed*	Pansy*	Wireweed*		
	Wireweed*	Pansy*	Parsley piert			
		Parsley piert	Pineapple weed			
		Pineapple weed	Poppy*			
		Poppy*	Redshank*			
		Redshank*	Shepherd's purse*			
		Shepherd's purse*	Wild radish*			
		Wild radish*	Wild turnip*			
		Wild turnip*	Wireweed*			
		Wireweed*				
Oilseed rape (winter application)	Shepherd's purse*	Cleavers*	Mayweed*		Corn Marigold*	
	Wireweed*	Docks*	Wireweed*		Corn*	
Oilseed rape (spring application)	Shepherd's purse*	Cleavers*	Mayweed*		Corn Marigold*	
	Wireweed*	Docks*	Wireweed*		Corn*	
Onions		Cleavers*	Docks*		Corn Marigold*	
					Corn*	

* Main weeds controlled, can be found listed under the product

† Suppression only

‡ Off-crop weed escape control

§ Off-crop weeds including grass weed escape with 2-3 t/ha label

¶ See page 4-7 for resistance information

Top and fin control

** Spring weeds only

†† Applications at a limited number of growth stages only (see label)

‡‡ Fully cert and seed to pot management, up to manuf

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Worldwide Reference Chart – Appendix

[illegible] Reference Sheet – [illegible]

Electronic Reference Chart – Acoustic

Herbicide Selector Chart – Cereals

Crop	Pre-emergence	Pre-establishment	Post-harvest	Suggested		
Barley	Cypress 10[1] Cypress Pro[1] Cypress 50 FirstStep Liquid Software 52[1] Titanium Trifluralin[1]	2,4-D Atoll Ally[1] Blackhawk[1] Eyfel Eyfel 50g MCPA 6 with Target[1]	Glyphosate (pre-harvest)	2,4-D Attain IR[1] Avail DNA Bantol WG[1] Outlook[1] Eyfel Eyfel 50g Embutox[1] Enforcer W	Estapyr[1] Express 10[1] Express 50 FirstStep Frontline XL[1] Infinity Lorox + MCPA[1] MCPA (all forms) Sir-T-San XL	Optica Trio Pardner[1] Picloram Stellar[1] Targit[1] Thumper[1] Titanium Trophy[1] Tropotrox Plus[1]
Wheat (X - CLEARFIELD wheat)	Attitude 10 (C) Cypress 10[1] Cypress Pro[1] Cypress 50 FirstStep Horizon[1] Liquid Software 52[1] Nyxx Prodiuretic Titanium Trecris Trecris Two Verso Velocity m3	2,4-D Atoll Ally[1] Blackhawk[1] Eyfel Eyfel 50g MCPA 6 with Target[1]	Glyphosate (pre-harvest)	2,4-D Attain IR[1] Avail DNA Bavagran Bantol WG[1] Outlook[1] Eyfel Eyfel 50g Embutox[1] Enforcer W Estapyr[1]	Express 10[1] Express 50 FirstStep Frontline XL[1] Frontline 2,4-D Infinity Lorox + MCPA[1] MCPA (all forms) Sir-T-San XL Optica Trio Pardner[1]	Nyxx Picloram Stellar[1] Targit[1] Thumper[1] Titanium Trecris Two Trophy[1] Tropotrox Plus[1]
Oats		Atoll Eyfel MCPA 6 with Target[1]	Glyphosate (pre-harvest)	Bantol WG[1] Outlook[1] Eyfel Frontline XL[1]	Embutox[1] Lorox + MCPA[1] MCPA (all forms) Optica Trio	Pardner[1] Stellar[1] Targit[1] Tropotrox Plus[1]
Fall Rye (spring application)	Liquid Software 52[1]	2,4-D Atoll MCPA 6 with		2,4-D Bantol WG[1] MCPA (all forms)	Pardner[1] Tropotrox Plus[1]	
Triticale	Liquid Software 52[1]	Atoll		Outlook[1]	Infinity	Pardner[1]

1. Other similar products can be found listed under this product
2. Suppression only
3. 450 spring wheat except Atoll
4. 450 spring wheat (excluding durum white and mixed) with 2,4-D ester
5. See page 41 for resistance information
6. Top growth control
7. Spring varieties only
8. Registered as a tankmix number of varieties, refer to label
9. To be used pre-seed or pre-emergence, as a tankmix

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Herbicide Selector Chart – Cereals

Crop	Buttercup, Pigweed			Round-leaved Mallow	Russian Pigweed
Barley	2,4-D Aim[2] Ally* Attain XC* Avast /Pak Banvel II* Barricade Blackhawk[2] Broadband[2] Buctril M* Curtail M Deploy* Distinct[2] Dyvel Dyvel DSp Embutox* Enforcer D Enforcer M Estaprop*	Express FX[2] Express Pro* Express SG FirstStep Fortress[2] Frontline XL* Goldwing[2] Hat Trick Heat[2] Infinity Lontrel + MCPA* MCPA[1] (all forms) Nuance* OnTarg XL Optica Trio Paradigm Partner* Pavano Prestige XC	Priority*[2,1] Pulsar[2] Refine M* Refine SG Retain Sencor Spectrum Stellar* Target* Thumper* Titanium Travallex Triton C Triton K Trophy* Trooptox Plus* Tundra	Aim[2] Attain XC* Avast /Pak Barricade Deploy[3] * Dyvel DSp[2] Enforcer D Estaprop* Goldwing[2] Heat[2] Infinity[2] OnTarg XL Prestige XC Refine M[3] * Refine SG[3] Retain[3] Triton C	2,4-D Banvel II* Blackhawk[2] Curtail M Dyvel Estaprop* Express Pro* Frontline XL* MCPA (all forms) Nuance* Prestige XC Stellar* Triton K
Oilseed (E - CLEARFIELD oilseed)	2,4-D Aim[2] Ally* Altitude FX (C) Attain XC* Avast /Pak Banvel II* Barricade Blackhawk[2] Broadband[2] Buctril M* Curtail M Deploy* Distinct[2] Dyvel Dyvel DSp Embutox* Enforcer D Enforcer M Estaprop* Everest[2] Everest DBX Express FX[2]	Express Pro* Express SG FirstStep Frontline XL* Frontline 2,4-D Goldwing[2] Harmony X[2] Harmony Max* Harmony SG Hat Trick Heat[2] Infinity Lontrel + MCPA* MCPA[1] (all forms) Nuance* OnTarg XL Optica Trio Pace Paradigm Pavano Predicate Prestige XC Priority*[2,1]	Pulsar[2] Refine M* Refine SG Retain Sencor Simplicity Spectrum Stellar* Tandem Target* Thumper* Titanium Travallex Treoos Two[2] Triton C Triton K Trophy* Trooptox Plus* Tundra Verro Velocity m3	Aim[2] Altitude FX[1](C) Attain XC* Avast /Pak Barricade Deploy[3] * Dyvel DSp[2] Enforcer D Estaprop* Goldwing[2] Harmony X[2,1] Harmony Max[2,1] * Harmony SG[2] Heat[2] Infinity[2] OnTarg XL Predicate Prestige XC Refine M[3] * Refine SG[3] Retain[3] Treoos Two Triton C Verro[2]	2,4-D Blackhawk[2] Curtail M Dyvel Estaprop* Express Pro* Frontline XL* MCPA (all forms) Nuance* Prestige XC Simplicity[2] Stellar* Triton K Velocity m3
Oats	Aim[2] Banvel II* Buctril M* Curtail M Deploy* Distinct[2] Dyvel Embutox*	Enforcer M Frontline XL* Goldwing[2] Heat[2] Lontrel + MCPA* MCPA[1] (all forms) Optica Trio Prestige XC	Priority*[2,1] Refine M* Refine SG Spectrum Stellar* Target* Trooptox Plus*	Aim[2] Deploy[3] * Goldwing[2] Heat[2] Prestige XC Refine M[3] * Refine SG[3]	Banvel II* Curtail M Dyvel Frontline XL* MCPA (all forms) Stellar*
Fall Rye (spring application)	2,4-D Aim[2] Buctril M*	Goldwing[2] MCPA[1] (all forms) Trooptox Plus*		Aim[2] Goldwing[2]	2,4-D MCPA (all forms)
Triticale	Aim[2] Distinct[2]	Enforcer M Goldwing[2]	Infinity	Aim[2] Goldwing[2] Infinity[2]	

* Other similar products can be found listed under this product
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] To be used pre-seed or pre-emergence, as a burnoff

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Herbicide Selector Chart – Cereals

Crop	Russian Thistle[4]		Scentless Chamomile	Shepherd's-purse		
Barley	2,4-D Ally[1,*] Attain XC* Axial iPak Barricade[1] Blackhawk[1] Buctril M* Deploy* DyVel DyVel DSp Enforcer D Enforcer M Estaprop* Express FX[1] Express Pro* Express SG FirstStep	Fortress[1] Infinity Nuance* OcTTain XL Pardner* Pulsar Refine M* Refine SG Retain Sencor Target* Thumper* Titanium Trevallies Trifluralin* Triton C Tundra	Ally* Buctril M* Curtail M Deploy[1,*] Enforcer M Express FX[1] Express SG[1] FirstStep[1] Lontrel Prestige XC Refine M[1,*] Refine SG[1] Retain[1] Titanium Triton C[1]	2,4-D Ally* Attain XC* Axial iPak Blackhawk[1] Broadband Buctril M* Curtail M Deploy* DyVel DyVel DSp Embutox* Enforcer D Enforcer M	Estaprop* Express Pro* Frontline XL* Het Trick Infinity KoAct[2] Lorox + MCPA* MCPA (all forms) Nuance* OcTTain XL Paradigm Pixxaro Prestige XC Priority*[,1]	Refine M* Refine SG Retain Spectrum Stellar* Target* Thumper* Titanium Triton C Triton K Trophy* Tropotox Plus* Tundra
Wheat (C - CLEARFIELD wheat)	2,4-D Ally[1,*] Altitude FX[1](C) Attain XC* Axial iPak Banvel II* Barricade[1] Blackhawk[1] Buctril M* Deploy* DyVel DyVel DSp Enforcer M Estaprop* Express FX[1] Express Pro* Express SG FirstStep Fortress[1] Frontline 2,4-D Harmony K[1] Harmony Max*	Harmony SG Enforcer D Infinity Nuance* OcTTain XL Pardner* Pace Pulsar Predicade Refine M* Refine SG Retain Sencor Target* Thumper* Titanium Trevallies Triton C Tundra Varro[1] Velocity m3	Ally* Buctril M* Curtail M Deploy[1,*] Enforcer M Express FX[1] Express SG[1] FirstStep[1] Harmony Max[1,*] Lontrel Predicade Prestige XC Refine M[1,*] Refine SG[1] Retain[1] Titanium Triton C[1]	2,4-D Ally* Altitude FX (C) Attain XC* Axial iPak Blackhawk[1] Broadband Buctril M* Curtail M Deploy* DyVel DyVel DSp Embutox* Enforcer D Enforcer M Estaprop* Everest GBX Everest[1,*] Express Pro*	Frontline XL* Frontline 2,4-D Harmony K[1] Harmony Max* Harmony SG Het Trick Inferno Duo[2,*] Infinity KoAct[2] Lorox + MCPA* MCPA (all forms) Nuance* OcTTain XL Pace Paradigm Pixxaro Predicade Prestige XC Priority*[,1]	Refine M* Refine SG Retain Sencor Simplicity Spectrum Stellar* Target* Thumper* Titanium Traxos Two Triton C Triton K Trophy* Tropotox Plus* Tundra Varro Velocity m3
Oats	Buctril M* Deploy* DyVel Pardner*	Refine M* Refine SG Target*	Buctril M* Curtail M Deploy[1,*] Lontrel Prestige XC Refine M[1,*] Refine SG[1]	Buctril M* Curtail M Deploy* DyVel Embutox* Frontline XL*	Lorox + MCPA* MCPA (all forms) Prestige XC Priority*[,1] Refine M* Refine SG	Spectrum Stellar* Target* Tropotox Plus*
Fall Rye (spring application)	2,4-D Buctril M* Pardner*		Buctril M*	2,4-D Buctril M* MCPA (all forms)	Tropotox Plus*	
Triticale	Infinity	Pardner*		Infinity		

* Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] To be used pre-seed or pre-emergence, as a burnoff

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Herbicide Selector Chart – Cereals

Crop	Stinkweed				Stork's-bill	
Barley	2,4-D Aim[2] Ally[◆] Assert[◆] Attain XC[◆] Axial iPak Barricade Blackhawk[4] Broadband Buctril M[◆] Curtail M Deploy[◆] DyVel	DyVel DSp Embutox[◆] Enforcer D Enforcer M Estaprop[◆] Express FX[5] Express Pro[◆] Express SG FirstStep Frontline XL[◆] Goldwing[3] Heat[5] Infinity	Lorox + MCPA[◆] MCPA (all forms) Nuance[◆] OcTTain XL Optica Trio Paradigm Pardner[◆] Pixxaro Prestige XC Priority[◆,6] Refine M[◆] Refine SG Sencor	Spectrum Stellar[◆] Target[◆] Thumper[◆] Titanium Travallas Triton C Triton K Trophy[◆] Tropotox Plus[◆] Tundra	Ally[◆] Attain XC[◆] Deploy[◆,1] Enforcer D Enforcer M[1] Estaprop[◆] FrontlineXL[1] Momentum[1] Lorox + MCPA[◆] OcTTain XL	Prestige XC Pulsar[1] Refine M[1,◆] Refine SG[1] Retain[1] Spectrum Stellar[1,◆] Travallas Triton C[1] Trophy[1,◆]
Wheat (C - CLEARFIELD wheat)	2,4-D Aim[2] Ally[◆] Altitude FX (C) Assert[◆] Attain XC[◆] Axial iPak Barricade Blackhawk[4] Broadband Buctril M[◆] Curtail M Deploy[◆] DyVel DyVel DSp Embutox[◆]	Enforcer D Enforcer M Estaprop[◆] Everest[◆] Everest GBX Express FX[5] Express Pro[◆] Express SG FirstStep Frontline XL[◆] Frontline 2,4-D Goldwing[3] Harmony K[7] Harmony Max[◆] Harmony SG Heat[5]	Infinity Lorox + MCPA[◆] MCPA (all forms) Nuance[◆] OcTTain XL Pace Optica Trio Paradigm Pardner[◆] Pixxaro Predicade Prestige XC Priority[◆,6] Refine M[◆] Refine SG Sencor	Spectrum Stellar[◆] Target[◆] Thumper[◆] Titanium Travallas Traxos Two Triton C Triton K Trophy[◆] Tropotox Plus[◆] Tundra Varro Velocity m3	Ally[◆] Altitude FX[1] (C) Attain XC[◆] Deploy[1,◆] Enforcer D Enforcer M[1] Estaprop[◆] Frontline XL[◆,1] Harmony K[1,2] Harmony Max[1,◆] Harmony SG[1] Momentum[1] Lorox + MCPA[◆] OcTTain XL	Predicade Prestige XC Pulsar[1] Refine M[1,◆] Refine SG[1] Retain[1] Spectrum Stellar[1,◆] Tandem[1] Travallas TraxosTwo Triton C[1] Trophy[1,◆]
Oats	Aim[2] Banvel II[◆] Buctril M[◆] Curtail M Deploy[◆] Embutox[◆]	Frontline XL[◆] Goldwing[3] Heat[5] Lorox + MCPA[◆] MCPA (all forms)	Optica Trio Pardner[◆] Prestige XC Priority[◆,6] Refine M[◆]	Refine SG Spectrum Stellar[◆] Target[◆] Tropotox Plus[◆]	Deploy[1] Frontline XL[◆,1] Lorox + MCPA[◆] Prestige XC	Refine M[1,◆] Refine SG[1] Spectrum Stellar[1,◆]
Fall Rye (spring application)	2,4-D Aim[2]	Buctril M[◆] Goldwing[3]	MCPA (all forms) Pardner[◆]	Tropotox Plus[◆]		
Triticale	Aim[2]	Goldwing[3]	Infinity	Pardner[◆]		

◆ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 41 for resistance information
5 Top growth control
6 Spring rosettes only
7 Registered on a limited number of varieties, refer to label
8 To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Cereals

Crop	Tall Buttercup	Tartary Buckwheat			Toadflax
Barley	MCPA amine MCPA Na-salt Tropotox Plus[5,♦]	Ally[♦] Assert[1,♦] Attain XC[♦] Banvel II[♦] Buctril M[♦] Curtail M	Deploy[♦] DyVel DyVel DSp Enforcer M Estaprop[♦] Lorox + MCPA[♦] MCPA[1] (all forms)	OcTTain XL Pardner[♦] Prestige XC Refine M[♦] Target[♦] Thumper[♦]	Ally[1,♦] Deploy[1,♦] Estaprop[1,♦] Refine M[1,♦] Refine SG[1] Retain[1] Triton C[1]
Wheat (C - CLEARFIELD wheat)	MCPA amine MCPA Na-salt Tropotox Plus[5,♦]	Ally[♦] Assert1[♦] Attain XC[♦] Banvel II[♦] Buctril M[♦] Curtail M Deploy[♦] DyVel DyVel DSp	Enforcer M Estaprop[♦] Frontline 2,4-D Harmony K[2] Harmony Max[♦] Harmony SG Lorox + MCPA[♦] MCPA[1](all forms) OcTTain XL	Pardner[♦] Prestige XC Refine M[♦] Refine SG Sencor Target[♦] Thumper[♦] Titanium Triton C	Ally[1,♦] Deploy[1,♦] Estaprop[1,♦] Harmony K[1,2] Harmony SG[1] Refine M[1,♦] Refine SG[1] Retain[1] Triton C[1]
Oats	MCPA amine MCPA Na-salt Tropotox Plus[5,♦]	Banvel II[♦] Buctril M[♦] Curtail M Deploy[♦]	DyVel Lorox + MCPA[♦] MCPA[1] (all forms) Pardner[♦]	Prestige XC Refine M[♦] Refine SG Target[♦]	Deploy[1] Refine M[1,♦] Refine SG[1]
Fall Rye (spring application)	MCPA amine MCPA Na-salt Tropotox Plus[5,♦]	Buctril M[♦] MCPA[1] (all forms) Pardner[♦]			
Triticale		Pardner[♦]			

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 41 for resistance information
5 Top growth control
6 Spring rosettes only
7 Registered on a limited number of varieties, refer to label
8 To be used pre-seed or pre-emergence, as a burnoff

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Herbicide Selector Chart – Cereals

Crop	Volunteer Canola, Wild Mustard, Other Mustards			Wild Buckwheat		
Barley	2,4-D Aim[5] Ally[•] Altitude FX (C) Attain XC[•] Axial iPak Barricade Blackhawk[3] Broadband Buctril M[•] Curtail M Deploy[•] DyVel DyVel DSp Distinct[5] Enforcer D	Enforcer M Estaprop[•] Express FX[5] Express SG Express Pro[•] FirstStep Frontline XL[•] Goldwing[5,1] Heat[5] Infinity KoAct[5] OcTTain XL Optica Trio Paradigm (not CLEARFIELD canola)	Prestige XC Priority[•,5] Refine SG Retain Sencor Spectrum Stellar[•] Target[•] Thumper[•] Titanium Travallas Triton C[5] Triton K Trophy[•] Tropotox Plus[•] Tundra	2,4-D[1] Ally[1,•] Assert[1,•] Attain XC[•] Axial iPak Banvel II[•] Barricade Broadband Buctril M[•] Curtail M Deploy[•] Distinct[5] DyVel DyVel DSp Embutox[•] Enforcer D Enforcer M Estaprop[•]	Express FX[5] Express SG[1] Express Pro[•] FirstStep Fortress[1] Frontline XL[•] Goldwing[5] Hat Trick Heat[5] Infinity Lontrel Lorox + MCPA[•] MCPA[1] (all forms) Momentum Nuance[•,1] OcTTain XL Optica Trio Paradigm	Pardner[•] Prestige XC Priority[•,5] Pulsar Refine M[•] Refine SG Retain Spectrum Stellar[•] Target[•] Thumper[•] Titanium Travallas Triton C Triton K[1] Trophy[1,•] Tundra
Wheat (C - CLEARFIELD wheat)	2,4-D Aim[5] Ally[•] Altitude FX (C) Attain XC[•] Axial iPak Barricade Blackhawk[3] Buctril M[•] Curtail M Deploy[•] Distinct[5] DyVel DyVel DSp Estaprop[•] Enforcer D Enforcer M Everest[6,•] Everest GBX Express FX[5] Express Pro[•]	Express SG FirstStep Frontline XL[•] Frontline 2,4-D Goldwing[5,1] Harmony K[2] Harmony Max[•] Harmony SG Heat[5] Infinity Inferno Duo[7,5] (vol .canola) KoAct[5] Pace Optica Trio Paradigm (not CLEARFIELD canola) Predicade Prestige XC Priority[•,5]	Refine M[•] Refine SG Retain Sencor Simplicity[5] Spectrum Stellar[•] Tandem(C) Target[•] Thumper[•] Titanium Travallas Traxos Two Triton C[5] Triton K Trophy[•] Tropotox Plus[•] Tundra Varro Velocity m3	2,4-D[1] Ally[1,•] Altitude FX (C) Assert[1,•] Attain XC[•] Axial iPak Banvel II[•] Barricade Broadband Buctril M[•] Curtail M Deploy[•] Distinct[5] DyVel DyVel DSp Embutox[•] Enforcer D Enforcer M Estaprop[•] Everest GBX Express FX[5] Express SG[1]	Express Pro[•] FirstStep Fortress[1] Frontline XL[•] Frontline 2,4-D Goldwing[5] Harmony K[2] Harmony Max[•] Harmony SG Hat Trick Momentum Heat[5] Infinity Lontrel Lorox + MCPA[•] MCPA[1] (all forms) Nuance[•,1] Optica Trio Pardner[•] Pace Paradigm	Predicade Prestige XC Priority[•,5] Pulsar Refine M[•] Refine SG Retain Simplicity[1] Spectrum Stellar[•] Tandem[1] Target[•] Thumper[•] Titanium Travallas Traxos Two Triton C Triton K[1] Trophy[1,•] Tundra Varro Velocity m3
Oats	Aim[5] Buctril M[•] Curtail M Deploy[•] Distinct[5] DyVel Enforcer M	Frontline XL[•] Goldwing[5,1] Heat[5] Optica Trio Prestige XC Priority[•,5] Refine M[•]	Refine SG Spectrum Stellar[•] Target[•] Tropotox Plus[•]	2,4-DB Banvel II[•] Buctril M[•] Curtail M Deploy[•] Distinct[5] DyVel Embutox[•]	Enforcer M Frontline XL[•] Goldwing[5] Heat[5] Lontrel Lorox + MCPA[•] MCPA[1] (all forms) Optica trio	Pardner[•] Prestige XC Priority[•,5] Refine M[•] Refine SG Spectrum Stellar[4] Target[•]
Fall Rye (spring application)	2,4-D Aim[5] Buctril M[•]	Goldwing[5,1] Tropotox Plus[•]		2,4-D[1] Buctril M[•]	Goldwing[5] MCPA[1] (all forms)	Pardner[•]
Triticale	Aim[5] Distinct[5]	Enforcer M Goldwing[5,1]	Infinity	Distinct[5] Enforcer M	Goldwing[5] Infinity	Pardner[•]

[•] Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Cereals

Crop	Wild Oats*		Wild Radish		
Barley	Assert*	FirstStep	2,4-D	Express SG	Paxaro
	Avadex BW	Fortress	Attain XC*	MCPA (all forms)	Stellar*
	Axial	Liquid Achieve SC*	DyVel	Nuance*	Trophy*
	Axial iPak	Puma*	Express Pro*	OpTain XL	Tropotox Plus*
	Broadband	Titanium			
	Express FX*	Trifluralin[1]*			
	Express Pro*	Tundra			
	Express SG				
Wheat (C - CLEARFIELD wheat)	Altitude FX (C)	Harmony SG	2,4-D	Express Pro*	Paxaro
	Assert*	Horizon*	Altitude FX (C)	Express SG	Stellar*
	Avadex BW	Inferno Duo[1,2,5]	Attain XC*	Frontline 2,4-D	Traxos Two
	Axial	Liquid Achieve SC*	DyVel	MCPA (all forms)	Trophy*
	Axial iPak	Pace	Everest GBX	Nuance*	Tropotox Plus*
	Broadband	Predicade			
	Everest*	Puma*			
	Everest GBX	Tandem			
	Express FX*	Titanium			
	Express Pro*	Traxos			
	Express SG	Traxos Two			
	FirstStep	Tundra			
	Fortress	Varro			
	Harmony K[2]	Velocity m3			
	Harmony Max*				
Oats			DyVel	Stellar*	
			MCPA (all forms)	Tropotox Plus*	
Fall Rye (spring application)	Liquid Achieve SC*		2,4-D		
			MCPA (all forms)		
			Tropotox Plus[1]*		
Triticale	Liquid Achieve SC*				

* Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 41 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Registered on a limited number of varieties, refer to label
[8] To be used pre-seed or pre-emergence, as a burnoff
C - volunteer canola only

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Herbicide Selector Chart – Oilseeds

Crop	Annual Smartweed/ Lady's Thumb	Annual Sow-thistle	Blackgrass Grass		Bladder	Canada Thistle
Canola	Edge/ Muster		Assure II* Clavon* Edge	Fusion Ultra Select* Trifluralin*		Lontrel
CLEARFIELD Canola	Arsenal Edge/ Odyssey Odyssey Ultra Solution Tercelo	Solution	Arsenal Clavon* Edge Odyssey	Odyssey Ultra Solution Solo Tercelo		Lontrel Solution Tercelo
Liberty Link Canola	Edge/ Liberty	Liberty	Clavon* Edge	Liberty		Liberty Lontrel
Roundup Ready Canola	Eclipse II Edge/ Glyphosate*	Eclipse II Glyphosate*	Clavon* Eclipse II	Edge Glyphosate*		Eclipse II Glyphosate* Lontrel
Flax	Basagran* Buctril M* MCPA (all forms) Pardner*	Curtail M MCPA (all forms)	Assure II* Fusion Ultra	Select* Trifluralin*	Buctril M* MCPA (all forms) Pardner*	Basagran* Buctril M* Curtail M Lontrel MCPA* (all forms)
Mustard	Avenge (C) Edge* (yellow only) Muster (brown and oriental only)		Avenge (C) Clavon* (brown and oriental only) Edge (yellow only)	Fusion Ultra Select* Trifluralin*		
Sunflowers	Edge*		Assure II Edge Fusion Ultra	Select* Solo (C) Trifluralin*		

* Other similar products can be found listed under this product
† Suppression only
‡ Pre-crop emergence to weed seedlings
§ Used as a crop desiccant
¶ See page 41 for resistance information
# Spring seedlings
** Spring rosettes only
†† Registered on a limited number of varieties, refer to label
‡‡ To be used pre-seed or pre-emergence, as a burnoff
(C) CLEARFIELD sunflowers only

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Herbicide Selector Chart – Oilseeds

Crop	Problems	Common Pigweed	Common Broomrape	Zero Tillage	Zero Tillage	Restrictions
Canola	Centurion[1] Edge[1]	Edge Trifluralin[1]	Lontrel	Ace[1] Edge	Edge Trifluralin[1]	
CLEARFIELD Canola	Arras Centurion[1] Edge[1] Infinity[1] Infinity Xtra Odyssey[1] Solo[1] Tercel[1]	Edge Infinity Infinity Xtra	Lontrel	Ace[1] Edge	Arras Centurion Odyssey Solo Tercel[1]	
Liberty Link Canola	Centurion[1] Edge[1] Liberty[1]	Edge[1] Liberty	Lontrel	Ace[1] Edge	Liberty	Liberty
Roundup Ready Canola	Centurion[1] Eclipse II Edge[1] Roundup[1]	Eclipse II Edge Roundup[1]		Ace[1] Eclipse II Edge Roundup[1]	Eclipse II Roundup[1]	Eclipse II Roundup[1]
Flax	Authority[1] Basagran[1]	Basagran[1] Curtail MCPA ester MCPA Na salt Trifluralin[1]	Basagran[1] Buctril M[1] Lontrel M Lontrel MCPA ester Pardner[1]	Ace[1] Basagran[1] Curtail	Buctril M[1] Pardner[1] Trifluralin[1]	Lontrel M MCPA: all forms
Mustard	Arras (1) Centurion[1] (brown and oriental only) Edge[1] (yellow only)	Edge (yellow only) Trifluralin[1]		Ace[1] Edge (yellow only)	Arras (1) Edge (yellow only) Trifluralin[1]	
Sunflowers	Authority[1] Edge[1] Solo (1)[1]	Edge Curtail Trifluralin[1]		Ace[1] Edge Curtail	Edge Solo (1) Trifluralin[1]	

[1] Other similar products can be found listed under this product.
(1) Suppression only.
(2) For crop emergence to weed seedlings.
(3) Used as a crop desiccant.
(4) See page 41 for resistance information.
(5) Spring seedings.
(6) Spring rosettes only.
(7) Registered on a limited number of varieties, refer to label.
(8) To be used pre-seed or pre-emergence, as a barrier.
(CLEARFIELD sunflowers only.

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Herbicide Selection Chart – Oilseeds

Crop	Trade Name(s)[a]	Trade Name(s)[a]	Remarks	Broad-Leaved[b]		Grass weeds
Canola			Annual	Annual [c] Annual [d] Flax Tartary	Perennial [e] Sow thistle Volunteer[f]	Cereal Flax Volunteer
Canola/Mustard/Flax/Canola			Annuals Perennial, thistle	Flax Annual [g] Perennial Perennial, thistle	Canada Sow Thistle	Flax Perennial Perennial, thistle Volunteer
Canola with Canola			Canola	Annual [h] Canola		Canola
Flax/Canola, Canola, Canola/Flax	Achieve [i] Hyphosate[j]		Achieve [i] Hyphosate[j]	Annual [k] Achieve [i]	Hyphosate[j]	Achieve [i] Hyphosate[j]
Flax	Assure[l] Assure[l] and bromoxynil	Assure[l] Assure[l] and	Assure[l] Liquid[m] Assure[l] and bromoxynil	Annual [n] Spray Tartary	Flax, Sow Assure[l] Volunteer[o]	Assure[l] and bromoxynil
Mustard			Mustard, Annual, and volunteer only	Annual [p] Annual, and volunteer only Edge (outline) only Tartary	Flax, Sow Assure[l] Volunteer[o]	Edge (outline) only Mustard, Annual, and volunteer only
Sunflowers				Annual [q] Flax Spray Sow thistle	Assure[l] Sow thistle Volunteer[o]	Edge

[a] Other similar products can be found listed under this product.
[b] Suppression only.
[c] Flax may emerge prior to weed seedlings.
[d] Assure is very tolerant.
[e] See page 21 for resistance information.
[f] Spring seedlings.
[g] Spring seedlings only.
[h] Registered at a limited number of locations, refer to label.
[i] To be used per acre to use emergence, as a mixture.
[j] ROUNDUP® is effective only.

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Insecticide Selection Chart – Abbreviated

Crop	Pest(s)	Spray	Cautions	Comments
Apple	Codling moth Leafrollers Plum curculio	Pre-bloom: dormant oil Petal fall: spinosad, azadirachtin Cover: spinosad, azadirachtin, kaolin clay	Do not apply spinosad during bloom.	Remove mummy fruit.
Cucumber, squash, melon	Cucumber beetles Squash vine borer Aphids	Soil drench: imidacloprid Foliar: neem oil, insecticidal soap	Neem oil may cause leaf burn in hot weather.	Row cover until flowering.
Tomato	Hornworms Flea beetles Whiteflies	Foliar: spinosad, neem oil Soil: imidacloprid	Do not apply spinosad within 3 days of harvest.	Hand-pick hornworms.
Grape	Japanese beetle Grape berry moth	Pre-bloom: dormant oil Post-bloom: spinosad	Limit spinosad to 4 applications per season.	Bag fruit clusters.
Blueberry	Spotted wing drosophila Aphids	Foliar: spinosad, insecticidal soap	Harvest daily during ripening.	Net bushes.
Pepper	Aphids Flea beetles Pepper maggot	Soil drench: imidacloprid Foliar: spinosad, neem oil	Do not apply spinosad during bloom.	Remove fallen fruit.

- Bee-safe options are listed first in each row.
- Rotate modes of action to prevent resistance.
- Do not exceed labeled pre-harvest intervals.
- Read and follow all label directions.
- Wear gloves and long sleeves when applying.
- Store pesticides out of reach of children and animals.
- Dispose of empty containers according to local regulations.
- Contact your county extension office for local recommendations.

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Antibiotic Selection Chart – Blurred

Drug	Spectrum	Indications	Dosing Notes	Common Reactions	Black Box
Amoxicillin	Gram+	Otitis, sinusitis, pneumonia	Renal adjust	Rash, diarrhea	None
Azithromycin	Gram+, atypicals	Pneumonia, STIs	Hepatic caution	QT prolongation	Cardiac risk
Ceftriaxone	Gram+, Gram−	Meningitis, pneumonia	Renal adjust	Diarrhea, rash	None
Doxycycline	Gram+, Gram−, atypicals	Malaria, acne, tick-borne	Avoid in pregnancy	Photosensitivity	Tooth staining
Vancomycin	Gram+	MRSA, C. diff (oral)	Trough monitoring	Red man syndrome	Nephrotoxicity
Ciprofloxacin	Gram−, some Gram+	UTI, GI infections	Renal adjust	Tendon rupture	Tendinitis

Pesticide Science Quiz – Answers

Herbicide Selector Chart – Oilseeds

Crop	Volunteer/ Wheat	Wild Buckwheat	Wild Oats[1]		Wild Tomato	Wild Mustard
Canola	Assure II[2] Edge Fusion (Ultra Select)[2]	Edge Fortress/ Lontrel Tribunil[2]	Assure II[2] Assure 200 Edge Fortress	Fusion (Ultra Select)[2] Tribunil[2]		Assure II[2] Edge Fusion (Ultra Select)[2]
CLEARFIELD Canola	Axial Odyssey Odyssey Ultra Select Solo[3] Tenvilo	Axial Odyssey Odyssey Ultra Select Solo[3] Tenvilo	Axial Odyssey Ultra Select Solo			
Liberty Link Canola	Liberty	Liberty	Liberty			
Roundup Ready Canola	Eclipse II Glyphosate[2]	Eclipse II Glyphosate[2]	Eclipse II Glyphosate[2]		Eclipse II Glyphosate[2]	
Flax	Assure II[2] Select Fusion (Ultra Select)[2]	Authority Buctril M[2] Lontrel 72 Tenvilo/ Lontrel MCPA Amine/ Pardner[2] Tribunil[2]	Assure II[2] Assure 200 Select Tenvilo	Fusion (Ultra Select)[2] Tribunil[2]	Buctril M[2]	Assure II[2] Select Fusion (Ultra Select)[2]
Mustard	Axial (1) Edge (yellow only) Fusion (Ultra Select)[2]	Axial (1) Edge (yellow only) Tenvilo/ Tribunil[2]	Axial (1) Assure 200 Edge (yellow only) Tenvilo	Fusion (Ultra Select)[2] Tribunil[2]		Edge Fusion (Ultra Select)[2]
Sunflowers	Edge Select Fusion (Ultra Select)[2] Solo (1)	Authority Edge Solo (1) Tribunil[2]	Edge Select Fusion (Ultra Select)[2]	Select[2] Solo (1) Tribunil[2]		Edge Select Fusion (Ultra Select)[2]

1. Wild oat/s products can be found listed under this section
2. Suppression only
3. For crop emergence to weed seedlings
4. Seal as a crop desiccant
5. See page 11 for resistance information
6. Spring seedings
7. Spring seeded only
8. Registered as a limited number of acres/ha, refer to label
9. To be used pre-seed or pre-emergence, as a burnoff

(1) CLEARFIELD sunflowers only

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Annual Grass/Broadleaf	Barnyard Grass		Dicotyledon	Canada Thistle	
Alfalfa	Seedling	Basagran[1] Embutox[1,*] Odyssey[1] Pardner[1,*] Pursuit[*]	Edge[1,*] Eptam[1] Liquid Achieve SC[1,*]	Odyssey[1] Poast Ultra Select[*] Tribunil[1,*]	Pardner[1,*]	Amitrol 240[1] Basagran[1,*] Embutox[1,*,‡]	Tropotox Plus[1,*]
	Established	Basagran[1] Odyssey[1] Pardner[1,*] Prowl[*] Reglone[1] Sencor[1]	Assure II[1,*] Odyssey[1] Poast Ultra	Prowl[*] Reglone[1]	Pardner[1,*] Reglone[1]	Amitrol 240[1] Basagran[1,*]	Reglone[1]
White Clover	Seedling	Basagran[1] Embutox[1,*]	Liquid Achieve SC[1,*]	Poast Ultra Tribunil[1,*]			
	Established		Poast Ultra				
Clover Wildvetch	Seedling		Eptam[1,*]	Tribunil[1,*]			
	Established		Select[*]		Tropotox Plus[1,*]	Amitrol 240	
Red Clover	Seedling	Basagran[1]	Liquid Achieve SC[1,*]	Tribunil[1,*]	MCPA amine	Amitrol 240[1] Basagran[1,*]	Tropotox Plus[1,*]
	Established	Reglone[1]	Reglone[1]		Reglone[1] MCPA amine	Amitrol 240[1]	Reglone[1]
Sweet Clover	Seedling		Eptam[1,*] Liquid Achieve SC[1,*]	Poast Ultra Tribunil[1,*]		Amitrol 240[1]	
	Established	Basagran[1]	Poast Ultra			Amitrol 240[1] Basagran[1,*]	
Alfalfa Clover	Seedling	Embutox[1,*] Tropotox Plus[1,*]	Liquid Achieve SC[1,*]	Tropotox Plus[1,*]		Amitrol 240[1] Embutox[1,*]	Tropotox Plus[1,*]
	Established	Reglone[1]	[1]		Reglone[1]	Amitrol 240[1] [*]	Reglone[1,*]
Bird's-foot Trefoil	Seedling	Embutox[1,*]	Eptam[1] Liquid Achieve SC[1,*]	Tribunil[1,*]		Embutox[1,*]	
	Established	Prowl[*] Reglone[1]	Prowl[*] Reglone[1]		Reglone[1]	Reglone[1]	
Birdsfoot	Seedling	Basagran[1]	Liquid Achieve SC[1,*]	Poast Ultra Tribunil[1,*]		Basagran[1,*]	
	Established		Poast Ultra				

* Other similar products can be found listed under this product.
† Suppression or control only control
‡ For crop emergence herbicide
§ Used as crop desiccant
¶ Under irrigation only
# Seed production only
** Forage production only
†† Underseeding only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Chickweed	Clovers	Common Groundsel	Corn Spurry	Dandelion
Alfalfa	Seedling	Basagran[3] Edge[2,3] Eptam[2] Odyssey[3] Trifluralin[2,4]		Basagran[3] Pardner[1,4] Pursuit[1,4]	Basagran[3] Edge[2,3] Eptam[2]	Embutox[1,4]
	Established	Basagran[3] Odyssey[3] Reglone[2] Sencor[4]	Princep[4] Reglone[2]	Basagran[3] Pardner[1,4] Reglone[2] Sencor[4]	Basagran[3] Reglone[2] Sencor[4]	Reglone[2] Velpar[4]
Alsike Clover	Seedling	Basagran[3] Trifluralin[2,4]		Basagran[3]	Basagran[3]	Embutox[1,4]
	Established					
Clover Milkvetch	Seedling	Eptam[2,3] Trifluralin[2,4]			Eptam[2,3]	
	Established					
Red Clover	Seedling	Basagran[3] Trifluralin[2,4]		Basagran[3]	Basagran[3]	
	Established	Reglone[2]	Reglone[2]	Reglone[2]	Reglone[2]	Reglone[2]
Sweet Clover	Seedling	Eptam[2,3] Trifluralin[2,4]			Eptam[2,3]	
	Established	Basagran[3]		Basagran[3]	Basagran[3]	
White Clover	Seedling					Embutox[1,4]
	Established	Reglone[2]	Reglone[2]	Reglone[2]	Reglone[2]	Reglone[2,3]
Bird's-foot Trefoil	Seedling	Eptam[2] Trifluralin[2,4]			Eptam[2]	Embutox[1,4]
	Established	Reglone[2]	Princep[4] Reglone[2]	Reglone[2]	Reglone[2]	Reglone[2]
Sainfoin	Seedling	Basagran[3] Trifluralin[2,4]		Basagran[3]	Basagran[3]	
	Established					

[1] Other similar products can be found listed under this product.
[2] Suppression only
[3] Pre-crop emergence herbicide
[4] Used as crop dessicant
[5] Under irrigation only
[6] Seed production only
[7] Forage production only
[8] Underseeding only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Field Bindweed		Flixweed (seedlings)	Foxtail Barley	Green Foxtail	
Alfalfa	Seedling	Basagran[1,5] Embutox[1,♦]	Tropotox Plus[1,5,♦]	Odyssey[6]	Poast Ultra[1]	Edge[2,5] Eptam[2] Liquid Achieve SC[7] Odyssey[6]	Poast Ultra Pursuit[1,♦] Select Trifluralin[2]
	Established	Basagran[1,5]	Reglone[3]	Odyssey[6] Reglone[3] Sencor[4]	Poast Ultra[1] Reglone[3]	Assure II[6,♦] Poast Ultra Odyssey[6]	Pursuit[1,5,♦] Reglone[3]
Alsike Clover	Seedling	Basagran[1,5] Embutox 625[1,♦]	Tropotox Plus[1,♦]			Liquid Achieve SC[7,♦] Poast Ultra	Trifluralin[2,♦]
	Established				Poast Ultra[1]	Poast Ultra	
Cicer Milk Vetch	Seedling					Eptam[2,5] Poast Ultra	Trifluralin[2,♦]
	Established				Poast Ultra[1]	Poast Ultra	
Red Clover	Seedling	Basagran[1,5]	Tropotox Plus[1,♦]	MCPA amine		Liquid Achieve SC[7,♦]	Trifluralin[2,♦]
	Established	Reglone[3]		MCPA amine Reglone[3]	Reglone[3]	Reglone[3]	
Sweet Clover	Seedling					Eptam[1,2,5] Liquid Achieve SC[7,♦]	Poast Ultra Trifluralin[2,♦]
	Established	Basagran[5]			Poast Ultra[1]	Poast Ultra	
White Clover	Seedling	Embutox[1,♦]	Tropotox Plus[1,♦]			Liquid Achieve SC[7,♦]	
	Established		Reglone[3]	Reglone[3]	Reglone[3]	Reglone[3]	
Bird's-foot Trefoil	Seedling		Embutox[1,♦]			Eptam[2] Liquid Achieve SC[7,♦]	Trifluralin[2,♦]
	Established		Reglone[3]	Reglone[3]	Reglone[3]	Reglone[3]	
Sainfoin	Seedling	Basagran[1,5]			Poast Ultra[1]	Liquid Achieve SC[7,♦] Poast Ultra	Trifluralin[2,♦]
	Established				Poast Ultra[1]	Poast Ultra	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-crop emergence herbicide
3 Used as crop dessicant
4 Under irrigation only
5 Seed production only
6 Forage production only
7 Underseeding only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Kochia	Lamb's-quarters		Leafy Spurge	Mustards	
Alfalfa	Seedling	Edge[2,5] Odyssey[1] Pardner[6,♦]	Basagran[5] Edge[2,5] Embutox[♦] Eptam[2] Odyssey[1,5]	Pardner[6,♦] Pursuit[1,♦] Trifluralin[2,♦] Tropotox Plus[5,♦]	Amitrol 240[6]	Basagran[5] Embutox[♦] Odyssey[5]	Pardner[6,♦] Pursuit[♦] Tropotox Plus[5,♦]
	Established	Odyssey[1,5] Pardner[6,♦] Reglone[3]	Basagran[5] Odyssey[1,5] Pardner[6,♦]	Princep[♦] Reglone[3] Sencor[4]	Amitrol 240[6] Reglone[3]	Basagran[5] Odyssey[5] Pardner[5,♦]	Pursuit[5,♦] Reglone[3] Sencor[4]
Alsike Clover	Seedling		Basagran[5] Embutox[♦]	Trifluralin[2,♦] Tropotox Plus[♦]	Amitrol 240[6]	Basagran[5] Embutox[♦]	Tropotox Plus[♦]
	Established				Amitrol 240[6]		
Cicer Milk Vetch	Seedling		Eptam[2,5]	Trifluralin[2,♦]			
	Established						
Red Clover	Seedling	MCPA amine	Basagran[5] MCPA amine	Trifluralin[2,♦] Tropotox Plus[♦]	Amitrol 240[6]	Basagran[5] MCPA amine	Tropotox Plus[♦]
	Established	MCPA amine Reglone[3]	MCPA amine	Reglone[3]	Amitrol 240[6] Reglone[3]	MCPA amine	Reglone[3]
Sweet Clover	Seedling		Eptam[1,7,5]	Trifluralin[2,♦]	Amitrol 240[6]		
	Established		Basagran[5]		Amitrol 240[6]	Basagran[5]	
White Clover	Seedling		Embutox[♦]	Tropotox Plus[♦]	Amitrol 240[6]	Embutox[♦]	Tropotox Plus[♦]
	Established	Reglone[3]	Reglone[3]		Amitrol 240[6] Reglone[3]	Reglone[3]	
Bird's-foot Trefoil	Seedling		Embutox[♦] Eptam[2]	Trifluralin[2,♦]	Amitrol 240[6]	Embutox[♦]	
	Established	Reglone[3]	Princep[♦]	Reglone[3]	Amitrol 240[6] Reglone[3]	Reglone[3]	
Sainfoin	Seedling		Basagran[5]	Trifluralin[2,♦]	Amitrol 240[6]	Basagran[5]	
	Established				Amitrol 240[6]		

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence herbicide
[3] Used as crop dessicant
[4] Under irrigation only
[5] Seed production only
[6] Forage production only
[7] Underseeding only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Narrow-leaved Hawk's-beard	Night-flowering Catchfly	Perennial Sow-thistle		Quack Grass	
Alfalfa	Seedling	Embutox 625[♦]	Pardner[6,♦]	Amitrol 240[5] Embutox[1,♦]	Tropotox Plus[1,5,♦]	Amitrol 240[5] Eptam[1,2]	Poast Ultra[1] Select[♦]
	Established	Reglone[3] Velpar[5]	Pardner[6,♦] Reglone[3] Sencor[4]	Amitrol 240[5] Reglone[3]	Tropotox Plus[1,♦] Velpar[5]	Amitrol 240[5] Assure II[♦]	Poast Ultra[1] Reglone[3] Velpar[5]
Alsike Clover	Seedling	Embutox[1,♦]		Amitrol 240[5] Embutox[1,♦]	Tropotox Plus[1,♦]	Amitrol 240[5]	Poast Ultra[1]
	Established			Amitrol 240[5]		Amitrol 240[5]	Poast Ultra[1]
Cicer Milk Vetch	Seedling						Poast Ultra[1]
	Established						Poast Ultra[1]
Red Clover	Seedling			Amitrol 240[5]	Tropotox Plus[1,♦]	Amitrol 240[5]	
	Established	Reglone[3]	Reglone[3]	Amitrol 240[5]	Reglone[3]	Amitrol 240[5]	Reglone[3]
Sweet Clover	Seedling			Amitrol 240[5]		Amitrol 240[5] Eptam[1,2]	Poast Ultra[1]
	Established			Amitrol 240[5]		Amitrol 240[5]	Poast Ultra[1]
White Clover	Seedling	Embutox[♦]		Amitrol 240[5] Embutox[1,♦]	Tropotox Plus[1,♦]	Amitrol 240[5]	
	Established	Reglone[3]	Reglone[3]	Amitrol 240[5]	Reglone[3]	Amitrol 240[5]	Reglone[3]
Bird's-foot Trefoil	Seedling	Embutox[♦]		Embutox[1,♦]		Eptam[1,2]	
	Established	Reglone[3]	Reglone[3]		Reglone[3]		Reglone[3]
Sainfoin	Seedling						Poast Ultra[1]
	Established						Poast Ultra[1]

♦ Other similar products can be found listed under this product.
1 Suppression or season long control
2 Pre-crop emergence herbicide
3 Used as crop dessicant
4 Under irrigation only
5 Seed production only
6 Forage production only
7 Underseeding only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Redroot Pigweed		Scentless Chamomile (seedlings)	Shepherd's-purse (seedlings)		Stinkweed (seedlings)	
Alfalfa	Seedling	Basagran[1,3] Edge[1,5] Embutox[4] Eptam[2] Odyssey[5]	Pardner[5,4] Pursuit[4] Trifluralin[2,4] Tropotox Plus[3,4]		Basagran[3] Embutox[4] Odyssey[5]	Pursuit[1,4] Tropotox Plus[3,4]	Basagran[3] Embutox[4] Odyssey[5]	Pardner[5,4] Pursuit[4] Tropotox Plus[3,4]
	Established	Basagran[1,3] Odyssey[5] Pardner[5,4]	Pursuit[5,4] Reglone[7] Sencor[5]	Reglone[7] Velpar[5]	Basagran[3] Odyssey[5]	Reglone[7] Sencor[5]	Basagran[3] Odyssey[5] Pardner[5,4]	Pursuit[5,4] Reglone[7] Sencor[5]
Alsike Clover	Seedling	Basagran[1,3] Embutox[4]	Trifluralin[2,4] Tropotox Plus[4]		Basagran[3] Embutox[4]	Tropotox Plus[4]	Basagran[3] Embutox[4]	Tropotox Plus[4]
	Established							
Cicer Milk Vetch	Seedling	Eptam[2,3]	Trifluralin[2,4]					
	Established							
Red Clover	Seedling	Basagran[1,3] MCPA amine	Trifluralin[2,4] Tropotox Plus[4]		Basagran[3] MCPA amine	Tropotox Plus[4]	Basagran[3] MCPA amine	Tropotox Plus[4]
	Established	MCPA amine Reglone[7]		Reglone[7]	MCPA amine Reglone[7]		MCPA amine Reglone[7]	
Sweet Clover	Seedling	Eptam[2,3]	Trifluralin[2,4]					
	Established	Basagran[1,3]			Basagran[3]		Basagran[3]	
White Clover	Seedling	Embutox[4]	Tropotox Plus[4]			Embutox[4] Tropotox Plus[4]		Embutox[4] Tropotox Plus[4]
	Established	Reglone[7]		Reglone[7]	Reglone[7]		Reglone[7]	
Bird's-foot Trefoil	Seedling	Embutox[4] Eptam[2]	Trifluralin[2,4]			Embutox[4]		Embutox[4]
	Established	Reglone[7]		Reglone[7]	Reglone[7]		Reglone[7]	
Sainfoin	Seedling	Basagran[1,3]	Trifluralin[2,4]		Basagran[3]		Basagran[3]	
	Established							

[4] Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence herbicide
[3] Used as crop dessicant
[4] Under irrigation only
[5] Seed production only
[6] Forage production only
[7] Underseeding only

Check individual herbicides for *grazing* or *feed* restrictions

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Herbicide Selector Chart – Forage Legumes

Crop	Crop Stage	Tall Buttercup	Toadflax	Wild Buckwheat		Wild Oats	
Alfalfa	Seedling	Basagran Tropotox Plus[1,4]	Amitrol 240[2]	Edge[1] Embutox[4] Odyssey[1]	Pardner[1,4] Trifluralin[1,4]	Avadex BW[1] Edge[1,5] Ophera[1] Liquid Achieve SC[1,4]	Microstarter[1] Odyssey[1] Poast Ultra Select[4] Trifluralin[1,4]
	Established	Basagran	Amitrol 240[2] Foglone[1]	Odyssey[1] Pardner[1,4]	Prowl[4] Reglone[1]	Assure II[1,4] Odyssey[1] Poast Ultra	Prowl[4] Reglone[1]
Alsike Clover	Seedling	Tropotox Plus[1,4]	Amitrol 240[2]	Embutox[4]	Trifluralin[1,4]	Assure II[1,4] Avadex BW[1] Liquid Achieve SC[1,4]	Microstarter[1] Poast Ultra Trifluralin[1,4]
	Established		Amitrol 240[2]			Poast Ultra	
Clean Milk Vetch	Seedling			Trifluralin[1,4]		Ophera[1] Poast Ultra	Trifluralin[1,4]
	Established					Poast Ultra	
Red Clover	Seedling	MCPA amine Tropotox Plus[1,4]	Amitrol 240[2]	Trifluralin[1,4]		Assure II[1,4] Avadex BW[1]	Liquid Achieve SC[1,4] Microstarter[1] Trifluralin[1,4]
	Established	MCPA amine	Amitrol 240[2] Reglone[1]	Reglone[1]		Reglone[1]	
Sweet Clover	Seedling		Amitrol 240[2]	Trifluralin[1,4]		Assure II[1,4] Avadex BW[1] Ophera[1]	Liquid Achieve SC[1,4] Microstarter[1] Poast Ultra Trifluralin[1,4]
	Established		Amitrol 240[2]			Poast Ultra	
White Clover	Seedling	Tropotox Plus[1,4]	Amitrol 240[2]	Embutox[4]		Assure II[1,4] Avadex BW[1]	Liquid Achieve SC[1,4] Microstarter[1]
	Established		Amitrol 240[2] Reglone[1]	Reglone[1]		Reglone[1]	
Bird's-foot Trefoil	Seedling			Embutox[4]	Trifluralin[1,4]	Assure II[1,4] Avadex BW[1] Ophera[1]	Liquid Achieve SC[1,4] Microstarter[1] Trifluralin[1,4]
	Established		Reglone[1]	Prowl[4]	Reglone[1]	Prowl[4]	Reglone[1]
Sainfoin	Seedling				Trifluralin[1,4]	Assure II[1,4] Liquid Achieve SC[1,4]	Poast Ultra Trifluralin[1,4]
	Established					Poast Ultra	

[1] Other similar products can be found listed under this product
[2] Suppression only
[3] Pre-crop emergence herbicide
[4] Used as crop desiccant
[5] Under irrigation only
[6] Seed production only
[7] Forage production only
[8] Undersowing only

Check individual herbicides for grazing or feed restrictions

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Annual Grass/weed					Remarks/ Notes
Meadow Bromegrass	Seeding	Altaxx 42 [1] [4] Dyalina [4]	MCPA Prestige 427	Refine 70 Spectrum [4]			
	Established	Altaxx 42 [1] [4] Dyalina [4]	Infinity MCPA	Prestige 427 Refine 70	Spectrum [4] Target [4]		
Smooth Bromegrass	Seeding	2,4-D Bannal DF Pardigm [4]	Buctril MF [1] Dyalina [4] MCPA	Pardner [1] [4] Prestige 427 Refine 70	Spectrum [4] Target [1] [4]		
	Established	2,4-D Dyalina [4]	MCPA Prestige 427	Refine 70 Spectrum [4]	Target [1] [4]		
Crested Wheatgrass	Seeding	2,4-D Altaxx 42 [1] [4] Bannal DF	Basagran [1] Buctril MF [1] [4] Dyalina [4]	MCPA Pardner [1] [4] Prestige 427	Refine 70 Spectrum [4] Target [1] [4]		
	Established	2,4-D Ally [4]	Altaxx 42 [1] [4] Dyalina [4]	MCPA Prestige 427	Refine 70 Spectrum [4]	Target [1] [4]	
Intermediate Wheatgrass	Seeding	2,4-D Altaxx 42 [1] [4] Bannal DF	Buctril MF Dyalina [4] MCPA	Pardner [1] [4] Prestige 427 Refine 70	Spectrum [4] Target [1] [4]		
	Established	2,4-D Ally [4]	Altaxx 42 [1] [4] Dyalina [4]	MCPA Prestige 427	Refine 70 Spectrum [4]	Target [1] [4]	
Creeping Red Fescue	Seeding	2,4-D Bannal DF	Basagran [1] Buctril MF [1] [4]	Dyalina [4] MCPA	Pardner [1] [4] Refine 70	Spectrum [4] Target [1] [4]	Fusion (Alta) [4]
	Established	2,4-D Ally [4] Altaxx 42 [1] [4]	Bannal DF Dyalina [4] Infinity	MCPA Prestige 427 Refine 70	Spectrum [4] Target [1] [4]		Aramo [4] [7] Fusion (Alta) [4]
Tall Fescue	Seeding	2,4-D Altaxx 42 [1] [4]	Bannal DF Buctril MF	Dyalina Infinity	MCPA Refine 70	Spectrum [4]	
	Established	2,4-D Altaxx 42 [1] [4]	Dyalina [4] MCPA	Prestige 427 Refine 70	Spectrum [4] Target [1] [4]		
Orchard Grass	Seeding	2,4-D Bannal DF	Basagran [1] Buctril MF [1] [4]	Dyalina [4] MCPA	Pardner [1] [4] Refine 70	Target [1] [4]	
	Established	2,4-D Ally [4]	Dyalina [4] MCPA	Refine 70 Target [1] [4]			
Timothy	Seeding	2,4-D Altaxx 42 [1] [4] Bannal DF	Basagran [1] Buctril MF [1] [4] Curtail M	Frontline XL [1] MCPA Pardner [1] [4]	Prestige 427 Spectrum [4] Target [1] [4]		
	Established	2,4-D Ally [4]	Altaxx 42 [1] [4] Buctril MF	Curtail M MCPA	Prestige 427 Spectrum [4]	Target [1] [4]	
Hay and Grazing	With legumes	Embutox [1] [3]					
	No legumes	2,4-D	Embutox [1] [4]	MCPA			

[1] Other similar products can be found listed under this product.
[2] Suppression only.
[3] Pre-plant incorporate treatment.
[4] Seed or crop dormant.
[5] Under irrigation only.
[6] Seed production only.
[7] Underseeding only.
[8] Forage production only.
[9] Fall application only.

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Pasture			Orchard
Bluebur Dichanthium	Seedling	Atrazi 420[1] 2,4-D	2,4-D ester		Atrazi 420[1] 2,4-D ester
	Established	Atrazi 420[1]			Atrazi 420[1] 2,4-D ester
Cocksfoot Dactylis glomerata	Seedling	2,4-D Atrazi 420[1]	Bromoxynil MCPA	Fluroxypyr[1]	Atrazi 420[1] MCPA 2,4-D ester
	Established	2,4-D Atrazi 420[1]	MCPA		Atrazi 420[1] MCPA 2,4-D ester
Crested Wheatgrass	Seedling	2,4-D Atrazi 420[1]	Bromoxynil MCPA	2,4-D ester Fluroxypyr[1]	Atrazi 420[1] MCPA 2,4-D ester
	Established	2,4-D Atrazi[1]	Atrazi 420[1] MCPA	2,4-D ester	Atrazi 420[1] MCPA 2,4-D ester
Intermediate Wheatgrass	Seedling	2,4-D Atrazi 420[1]	Bromoxynil MCPA	2,4-D ester Fluroxypyr[1]	Atrazi 420[1] MCPA 2,4-D ester
	Established	2,4-D Atrazi[1]	Atrazi 420[1] MCPA	2,4-D ester	Atrazi 420[1] MCPA 2,4-D ester
Lovegrass Weir Premium	Seedling	2,4-D Atrazi 420[1]	Bromoxynil MCPA	2,4-D ester Fluroxypyr[1]	Atrazi 420[1] MCPA 2,4-D ester
	Established	2,4-D Atrazi[1]	MCPA	2,4-D ester	Atrazi 420[1] MCPA 2,4-D ester
Tall Fescue	Seedling	2,4-D Atrazi 420[1]	Bromoxynil MCPA	2,4-D ester Fluroxypyr[1]	Atrazi 420[1] 2,4-D ester
	Established	2,4-D Atrazi[1]	Atrazi 420[1]	MCPA 2,4-D ester	Atrazi 420[1] 2,4-D ester
Timothy Phleum pratense	Seedling	2,4-D Bromoxynil[1]	MCPA	Fluroxypyr[1]	
	Established	2,4-D	Atrazi 420[1]	MCPA	
Tussock	Seedling	Atrazi 420[1] Bromoxynil[1]	MCPA 2,4-D ester	Fluroxypyr[1]	Atrazi 420[1] MCPA 2,4-D ester
	Established	2,4-D Atrazi[1]	Atrazi 420[1] Bromoxynil	MCPA 2,4-D ester	Atrazi 420[1] MCPA 2,4-D ester
Wet soil Kikuyu	Fully vegetative				
	Re-vegetative	2,4-D	MCPA		Fusion MCPA

[1] Other similar products can be found listed under this product.
[2] Suppression only.
[3] For plant recuperate treatment.
[4] Spot or crop treatment.
[5] Under irrigation only.
[6] Seed production only.
[7] Undersowing only.
[8] Forage production only.
[9] Hill application only.

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Dandelion			Field Bindweed		
Meadow Bromegrass	Seeding	Attain XC[1,9] WDN	GoTime[2] Prestige XC[2]	Spectrum[2]	Attain XC[1,9]		GoTime[2]
	Establishment	Attain XC[1,9] WDN	Infinity[2] GoTime[2]	Prestige XC[2] Spectrum[2]	Attain XC[1,9]	GoTime[2]	Target[1,9]
Smooth Bromegrass	Seeding	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9] Basagran[11]	WDN GoTime[2]	Target[1,9]
	Establishment	2,4-D Attain XC[1,9] WDN	GoTime[2] Prestige XC[2]	Infinity[2] Spectrum[2]	2,4-D Attain XC[1,9]	GoTime[2]	WDN
Crested Wheatgrass	Seeding	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9] Basagran[11]	WDN GoTime[2]	Target[1,9]
	Establishment	2,4-D Attain XC[1,9]	WDN Prestige XC[2]	Spectrum[2]	2,4-D Attain XC[1,9]	WDN	GoTime[2]
Intermediate Wheatgrass	Seeding	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9]	WDN	GoTime[2]
	Establishment	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9]	WDN	GoTime[2] Target[1,9]
Creeping Red Fescue	Seeding	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9]	Basagran[11] WDN	GoTime[2] Target[1,9]
	Establishment	2,4-D Attain XC[1,9]	WDN GoTime[2]	Spectrum[2]	2,4-D Attain XC[1,9]	GoTime[2]	WDN
Tall Fescue	Seeding	2,4-D Attain XC[1,9]	WDN GoTime[2]	Spectrum[2]	2,4-D Attain XC[1,9]	GoTime[2]	WDN
	Establishment	2,4-D Attain XC[1,9]	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9]	WDN	GoTime[2] Target[1,9]
Northern Grass	Seeding	2,4-D	WDN		2,4-D Basagran[11]	WDN	Target[1]
	Establishment	2,4-D	WDN		2,4-D	WDN	Target[1,9]
Timothy	Seeding	2,4-D Attain XC[1,9] Lontrel XC	WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9] Basagran[11]	WDN	GoTime[2] Target[1,9]
	Establishment	2,4-D Atly[1] Attain XC[1,9]	Lontrel XC WDN GoTime[2]	Prestige XC[2] Spectrum[2]	2,4-D Attain XC[1,9]	WDN	GoTime[2]
Hay and Grazing	With Legumes	Banvel 240		Embutox[1,9]			Tripotex Plus[1,9]
	No Legumes	2,4-D Banvel 240	Embutox[1,9] Dacamine	Dicamba WDN	2,4-D Banvel 4[1,9]	Embutox[1,9] WDN	Tordon 22K Tripotex Plus[1,9]

1. Other onsite products can be found listed under this product.
2. Suppression only.
3. Fall plant susceptible treatment.
4. Used as crop dormant.
5. Under irrigation only.
6. Seed production only.
7. Underseeding only.
8. Forage production only.
9. Cut application only.

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Fibrewood (seedlings)				Grass Fortail
Meadow Bromegrass	Seeding	Attain XC[1,*] Deploy*	MCPA OxiTron[2]	Prestige XC[2] Refine SG	Spectrum[2]	
	Established	Attain XC[1,*] Deploy*	MCPA Infinity	Prestige XC[2] Refine SG	Spectrum[2] Target[1,*]	
Smooth Bromegrass	Seeding	2,4-D Attain XC[1,*] Buctril M[1,*]	Deploy* MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	
	Established	2,4-D Attain XC[1,*] Deploy*	Infinity MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	Liquid Achieve SC[1,*]
Crested Wheatgrass	Seeding	2,4-D Attain XC[1,*] Buctril M[1,*]	Deploy* MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	
	Established	2,4-D Ally* Attain XC[1,*]	Deploy* MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	Liquid Achieve SC*
Intermediate Wheatgrass	Seeding	2,4-D Attain XC[1,*] Buctril M[1,*]	MCPA Deploy*	Prestige XC[2] Refine SG	Spectrum[2] Target[1,*]	
	Established	2,4-D Ally* Attain XC[1,*]	Deploy* MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	
Creeping Red Fescue	Seeding	2,4-D Attain XC[1,*] Buctril M[1,*]	Deploy* MCPA OxiTron[2]	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	Poast Ultra[2]
	Established	2,4-D Ally* Attain XC[1,*]	Deploy* OxiTron[2] MCPA	Prestige XC[2] Refine SG Spectrum[2]	Target[1,*]	Assure II[1,*] Poast Ultra[2]
Tall Fescue	Seeding	2,4-D Attain XC[1,*]	Buctril M[1,*] Deploy*	MCPA OxiTron[2]	Refine SG Spectrum[2]	
	Established	2,4-D Attain XC[1,*] Deploy*	MCPA OxiTron[2]	Prestige XC[2] Refine SG	Spectrum[2] Target[1,*]	
Orchard Grass	Seeding	2,4-D Buctril M[1,*]	Deploy* MCPA	Refine SG Target[1,*]		
	Established	2,4-D Ally*	Deploy* MCPA	Refine SG Target[1,*]		
Timothy	Seeding	2,4-D Attain XC[1,*] Curtail M	Buctril M[1,*] Infinity[2] MCPA	OxiTron[2] Prestige XC[2] Spectrum[2]	Target[1,*]	
	Established	2,4-D Ally[1,*] Attain XC[1,*]	Buctril M[1] Curtail M MCPA	OxiTron[2] Prestige XC[2] Spectrum[2]	Target[1,*]	
Vine and Grazing	With Legumes					
	No Legumes	2,4-D	MCPA			

* Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre plant incorporate treatment
[3] Used as crop dessicant
[4] Under irrigation only
[5] Seed production only
[6] Underseeding only
[7] Forage production only
[8] Fall application only

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Hemp-nettle			Kochia			
Meadow Bromegrass	Seeding	Attain XC[1,5,9] Deploy[9] MCPA[1]	OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2]	Attain XC[5,9] Deploy[9,7]	MCPA OcTTain[2]	Prestige XC[5] Refine SG[7]	
	Established	Attain XC[1,5,9] Deploy[9] Infinity	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	Attain XC[5,9] Deploy[9,7]	Infinity MCPA	OcTTain[2] Prestige XC[5]	Refine SG[7] Target[7,9]
Smooth Bromegrass	Seeding	Attain XC[1,5,9] Banvel II[9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9] Buctril M[6,9]	Deploy[9,7] OcTTain[2] Pardner[6,9]	Prestige XC[5] Refine SG[7] Target[7,9]	MCPA
	Established	Attain XC[1,5,9] Deploy[9] Infinity	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9]	Deploy[9,7] MCPA	OcTTain[2] Prestige XC[5]	Refine SG[7] Target[7,9]
Crested Wheatgrass	Seeding	Attain XC[1,5,9] Banvel II[9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9] Buctril M[6,9]	Deploy[9,7] MCPA OcTTain[2]	Pardner[6,9] Prestige XC[5] Refine SG[7]	Target[7,9]
	Established	Ally[9] Attain XC[1,5,9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Ally[7,9] Attain XC[5,9]	Deploy[9,7] MCPA OcTTain[2]	Prestige XC[5] Refine SG[7] Target[7,9]	
Intermediate Wheatgrass	Seeding	Attain XC[1,5,9] Banvel II[9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9] Buctril M[6,9]	Deploy[9,7] MCPA OcTTain[2]	Pardner[6,9] Prestige XC[5] Refine SG[7]	Target[7,9]
	Established	Ally[9] Attain XC[1,5,9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Ally[7,9] Attain XC[5,9]	Deploy[9,7] MCPA OcTTain[2]	Prestige XC[5] Refine SG[7] Target[7,9]	
Creeping Red Fescue	Seeding	Attain XC[1,5,9] Banvel[9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9] Buctril M[6,9]	Deploy[9,7] MCPA OcTTain[2]	Pardner[6,9] Prestige XC[5] Refine SG[7]	Target[7,9]
	Established	Ally[9] Attain XC[1,5,9] Deploy[9]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Refine SG Spectrum[2] Target[7,9]	2,4-D Ally[7,9] Attain XC[5,9]	Deploy[9,7] Infinity MCPA	OcTTain[2] Prestige XC[5] Refine SG[7]	Target[7,9]
Tall Fescue	Seeding	Attain XC[1,5,9] Banvel II[9] Deploy[9]	MCPA[1] OcTTain[2]	Refine SG Spectrum[2]	2,4-D Attain XC[5,9]	Buctril M[6,9] Deploy[9,7]	MCPA OcTTain[2]	Refine SG[7]
	Established	Attain XC[1,5,9] Deploy[9] MCPA[1]	OcTTain[2] Prestige XC[1,5] Refine SG	Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9]	Deploy[9,7] MCPA	OcTTain[2] Prestige XC[5]	Refine SG[7] Target[7,9]
Orchard Grass	Seeding	Banvel II[9] Deploy[9]	MCPA[1] Refine SG	Target[7,9]	2,4-D Buctril M[6,9]	Deploy[9,7] MCPA	Pardner[6,9] Refine SG[7]	Target[7,9]
	Established	Ally[9] Deploy[9]	MCPA[1] Refine SG	Target[7,9]	2,4-D Ally[7,9]	Deploy[9,7] MCPA	Refine SG[7] Target[7,9]	
Timothy	Seeding	Attain XC[1,5,9] Banvel II[9] Infinity[3]	MCPA[1] OcTTain[2] Prestige XC[1,5]	Spectrum[2] Target[7,9]	2,4-D Attain XC[5,9]	Buctril M[6,9] Curtail M[7]	Infinity[3] OcTTain[2]	Prestige XC[5] Target[7,9]
	Established	Ally[9] Attain XC[1,5,9]	MCPA[1] Prestige XC[1,5]	Spectrum[2] Target[7,9]	2,4-D Ally[9] Attain XC[5,9]	Buctril M[9] Curtail M[7]	MCPA OcTTain[2]	Prestige XC[5] Target[7,9]
Hay and Grazing	With Legumes	Tropotox Plus[1,9]						
	No Legumes	MCPA[1]	Tropotox Plus[1,9]		2,4-D	Escort	MCPA	

[9] Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-plant incorporate treatment
[3] Used as crop dessicant
[4] Under irrigation only
[5] Seed production only
[6] Underseeding only
[7] Forage production only
[8] Fall application only
[*] 90% of kochia-surveyed fields have resistance to Group 2 herbicides such as these products. Use herbicides from another herbicide group to control kochia.

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Lamb's-quarters				
Meadow Bromegrass	Seedling	Attain XC[5,♦] Deploy[♦]	MCPA	Prestige XC[5]	Refine SG	Spectrum[5]
	Established	Attain XC[5,♦] Deploy[♦]	Infinity MCPA	OcTTain[5] Prestige XC[5]	Refine SG Spectrum[5]	Target[7,♦]
Smooth Bromegrass	Seedling	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] Deploy[♦] MCPA	OcTTain[5] Pardner[5,♦] Prestige XC[5]	Refine SG Spectrum[5] Target[7,♦]	
	Established	2,4-D Attain XC[5,♦]	Deploy[♦] Infinity	MCPA OcTTain[5]	Prestige XC[5] Refine SG	Spectrum[5] Target[7,♦]
Crested Wheatgrass	Seedling	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] Deploy[♦] MCPA	OcTTain[5] Pardner[5,♦]	Prestige XC[5] Refine SG	Spectrum[5] Target[7,♦]
	Established	2,4-D Ally[♦,1]	Attain XC[5,♦] Deploy[♦]	MCPA OcTTain[5]	Prestige XC[5] Refine SG	Spectrum[5] Target[7,♦]
Intermediate Wheatgrass	Seedling	2,4-D Attain XC[5,♦] Buctril M[5,♦]	Deploy[♦] OcTTain[5]	MCPA Pardner[5,♦]	Prestige XC[5] Refine SG	Spectrum[5] Target[7,♦]
	Established	2,4-D Ally[♦,1]	Attain XC[5,♦] Deploy[♦]	MCPA OcTTain[5]	Prestige XC[5] Refine SG	Spectrum[5] Target[7,♦]
Creeping Red Fescue	Seedling	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] Deploy[♦] MCPA	OcTTain[5] Prestige XC[5]	Refine SG Spectrum[5]	Target[7,♦] Pardner[5,♦]
	Established	2,4-D Ally[♦,1] Attain XC[5,♦]	Banvel II[♦] Deploy[♦] MCPA	OcTTain[5] Prestige XC[5]	Refine SG Spectrum[5]	Target[7,♦]
Tall Fescue	Seedling	2,4-D Attain XC[5,♦]	Buctril M[5,♦] Deploy[♦]	MCPA OcTTain[5]	Refine SG	Spectrum[5]
	Established	2,4-D Attain XC[5,♦]	Deploy[♦] MCPA	OcTTain[5] Prestige XC[5]	Refine SG Spectrum[5]	Target[7,♦]
Orchard Grass	Seedling	2,4-D Basagran[5]	Buctril M[5,♦] Deploy[♦]	MCPA Pardner[5,♦]	Refine SG	Target[7,♦]
	Established	2,4-D Ally[♦,1]	Deploy[♦]	MCPA	Refine SG	Target[7,♦]
Timothy	Seedling	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] Curtail M Infinity[5]	MCPA OcTTain[5] Pardner[5,♦]	Prestige XC[5] Spectrum[5]	Target[7,♦]
	Established	2,4-D Ally[♦]	Buctril M[5,♦] Curtail M	MCPA OcTTain[5]	Prestige XC[5] Spectrum[5]	Target[7,♦]
Hay and Grazing	With Legumes	Embutox[♦]	Tropotox Plus[♦]			
	No Legumes	2,4-D	Embutox[♦]	MCPA	Tropotox Plus[♦]	

♦ Other similar products can be found listed under this product.
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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Leafy Spurge		Mustards			
Meadow Bromegrass	Seedling	Attain XC[5,♦,1] MCPA[1]	OcTTain[5,1]	Attain XC[5,♦]	MCPA	OcTTain[5]	Spectrum[5]
	Established	Attain XC[5,♦,1] MCPA[1]	OcTTain[5,1]	Attain XC[5,♦]	MCPA	OcTTain[5]	Spectrum[5]
Smooth Bromegrass	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	Basagran[5] Buctril M[5,♦]	MCPA Pardner[5,♦]	Spectrum[5] Target[7,♦]
	Established	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	MCPA OcTTain[5,1]	Spectrum[5]	Target[7,♦]
Crested Wheatgrass	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] MCPA OcTTain[5]	Pardner[5,♦] Spectrum[5]	Target[7,♦]
	Established	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Ally[♦]	Attain XC[5,♦] MCPA	OcTTain[5] Spectrum[5]	Target[7,♦]
Intermediate Wheatgrass	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	Buctril M[5,♦] MCPA	OcTTain[5] Pardner[5,♦]	Spectrum[5] Target[7,♦]
	Established	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	Ally[♦] Attain XC[5,♦]	MCPA OcTTain[5]	Spectrum[5]	Target[7,♦]
Creeping Red Fescue	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] MCPA OcTTain[5]	Pardner[5,♦] Spectrum[5]	Target[7,♦]
	Established	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Ally[♦]	Attain XC[5,♦] MCPA	OcTTain[5] Spectrum[5]	Target[7,♦]
Tall Fescue	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	Buctril M[5,♦] MCPA	OcTTain[5]	Spectrum[5]
	Established	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	MCPA OcTTain[5]	Spectrum[5]	Target[7,♦]
Orchard Grass	Seedling	2,4-D[1] MCPA[1]		2,4-D Basagran[5]	Buctril M[5,♦] MCPA	Pardner[5,♦]	Target[7,♦]
	Established	2,4-D[1]	MCPA[1]	2,4-D	Ally[♦]	MCPA	Target[7,♦]
Timothy	Seedling	2,4-D[1] Attain XC[5,♦,1]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦] Basagran[5]	Buctril M[5,♦] Curtail M Infinity[5]	MCPA OcTTain[5] Pardner[5,♦]	Spectrum[5] Target[7,♦]
	Established	2,4-D[1] Attain XC[5,♦]	MCPA[1] OcTTain[5,1]	2,4-D Attain XC[5,♦]	Buctril M[♦] Curtail M	MCPA Spectrum[5]	Target[7,♦]
Hay and Grazing	With Legumes	Amitrol 240		Embutox [♦]	Tropotox Plus[♦]		
	No Legumes	2,4-D[1] Amitrol 240	MCPA[1] Tordon 22K	2,4-D	Embutox [♦]	MCPA	Tropotox Plus[♦]

♦ Other similar products can be found listed under this product.
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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Narrow-leaved Hawk's-beard		Night-flowering Catchfly		
Meadow Bromegrass	Seedling	Deploy®	Refine SG			
	Established	Deploy®	Refine SG	Target[7]®		
Smooth Bromegrass	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®	Pardner[5,6]®	Target[7]®
	Established	2,4-D[1] Deploy®	Infinity Refine SG	Target[7]®		
Crested Wheatgrass	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®	Pardner[6]®	Target[7]®
	Established	2,4-D[1] Ally®	Deploy® Refine SG	Target[7]®		
Intermediate Wheatgrass	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®	Pardner[5,6]®	Target[7]®
	Established	2,4-D[1] Ally®	Deploy® Refine SG	Target[7]®		
Creeping Red Fescue	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®	Pardner[5,6]®	Target[7]®
	Established	2,4-D[1] Ally® Deploy®	Infinity Refine SG	Target[7]®		
Tall Fescue	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®		
	Established	2,4-D[1] Deploy®	Refine SG	Target[7]®		
Orchard Grass	Seedling	2,4-D[1] Deploy®	Refine SG	Buctril M[5,6]®	Pardner[5,6]®	Target[7]®
	Established	2,4-D[1] Ally®	Deploy® Refine SG	Target[7]®		
Timothy	Seedling	2,4-D[1]	Infinity[5]	Buctril M[5,6]®	Pardner[5,6]®	Target[7]®
	Established	2,4-D[1] Ally[7,8]®	Infinity[5]	Buctril M[6]	Target[7]®	
Hay and Grazing	With Legumes		Embutox® (all fall applied)			
	No Legumes	2,4-D[1]	Embutox® (all fall applied)			

® Other similar products can be found listed under this product.
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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Perennial Sow-thistle				Plantain	Prickly Lettuce
Meadow Bromegrass	Seedling	Attain XC[1,6] OcTTain[1,5] Prestige XC[5]	Spectrum[1,5]				MCPA
	Established	Attain XC[1,6] Infinity[1] OcTTain[1,5] Prestige XC[5]	Spectrum[1,5] Target[1,6]				MCPA
Smooth Bromegrass	Seedling	2,4-D[1] Attain XC[1,6] Banvel II[1,6] Buctril M[1,5,6] Lontrel	OcTTain[1,5] Prestige XC[5] Spectrum[1,5] Target[1,6]				MCPA
	Established	2,4-D[1] Attain XC[1,6] Lontrel MCPA[1] OcTTain[1,5]	Infinity[1] Prestige XC[5] Spectrum[1,5] Target[1,6]				MCPA
Crested Wheatgrass	Seedling	2,4-D[1] Attain XC[1,6] Banvel II[1,6] Buctril M[1,5,6] OcTTain[1,5] Lontrel	Prestige XC[5] Spectrum[1,5] Target[1,6]				MCPA
	Established	2,4-D[1] Ally[1,6] Attain XC[1,6] Lontrel MCPA[1] Prestige XC[5]	Spectrum[1,5] Target[1,6]				MCPA
Intermediate Wheatgrass	Seedling	2,4-D[1] Attain XC[1,6] Banvel II[1,6] Buctril M[1,5,6] OcTTain[1,5] Lontrel Prestige XC[5]	Spectrum[1,5] Target[1,6]				MCPA
	Established	2,4-D[1] Ally[1,6] Attain XC[1,6] Lontrel MCPA[1]	Prestige XC[5] Spectrum[1,5] Target[1,6] OcTTain[1,5]				MCPA
Creeping Red Fescue	Seedling	2,4-D[1] Attain XC[1,6] Banvel II[1,6] Buctril M[1,5,6] OcTTain[1,5] Lontrel Prestige XC[5] Spectrum[1,5] Target[1,6]					MCPA
	Established	2,4-D[1] Ally[1,6] Attain XC[1,6] Banvel II[1,6] Infinity[1] Lontrel MCPA[1] OcTTain[1,5] Prestige XC[5] Spectrum[1,5] Target[1,6]					MCPA
Tall Fescue	Seedling	2,4-D[1] Attain XC[1,6] Buctril M[1,5,6] Lontrel OcTTain[1,5] Spectrum[1,5]					MCPA
	Established	2,4-D[1] Attain XC[1,6] Lontrel OcTTain[1,5] Prestige XC[5] Spectrum[1,5] Target[1,6]					MCPA
Orchard Grass	Seedling	2,4-D[1] Banvel II[1,6] Buctril M[1,5,6] Lontrel Target[1,6]					MCPA
	Established	2,4-D[1] Ally[1,6] Lontrel Target[1,6]					MCPA
Timothy	Seedling	2,4-D[1] Attain XC[1,6] Banvel II[1,6] Buctril M[1,5,6] Curtail M Infinity[1,5] Lontrel OcTTain[1,5] Prestige XC[5] Spectrum[1,5] Target[1,6]					MCPA
	Established	2,4-D[1] Ally[1,6] Attain XC[1,6] Buctril M[1,6] Curtail M Lontrel MCPA[1] OcTTain[1,5] Prestige XC[5] Spectrum[1,5] Target[1,6]					MCPA
Hay and Grazing	With Legumes	Amitrol 240 Embutox[1,6] Tropotox Plus[1,6] Tropotox Plus[1,6]					
	No Legumes	2,4-D[1] Amitrol 240 Embutox[1,6] Escort[1] Lontrel MCPA[1] Tropotox Plus[1,6] Tordon 22K Grazon Tropotox Plus[1,6]					Grazon MCPA

[6] Other similar products can be found listed under this product.
[1] Suppression only
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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Search Cross	Redroot Pigweed				
Meadow Bromegrass	Seeding		Attain 4D [1,4] Dayday[4]	Curtail[1]	Prestige 4D[1]	Refine SG	Spectrum[1]
	Established		Attain 4D [1,4] Dayday[4]	Infinity Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1]	Target [1,4]
Smooth Bromegrass	Seeding		2,4-D Attain 4D [1,4]	Basagran[1] Buctril MF[4]	Dayday[4] Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target [1,4]
	Established		2,4-D Attain 4D [1,4]	Dayday[4] Infinity	MCPB Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target [1,4]
Crested Wheatgrass	Seeding		2,4-D Attain 4D [1,4]	Basagran[1] Buctril MF[4]	Dayday[4] Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target [1,4]
	Established		2,4-D Ally[4]	Attain 4D[1,4] Dayday[4]	MCPB Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target[1,4]
Intermediate Wheatgrass	Seeding		2,4-D Attain 4D [1,4]	Buctril MF[4] Dayday[4]	Curtail[1] Prestige 4D[1]	Refine SG Spectrum[1]	Target [1,4]
	Established		2,4-D Ally[4]	Attain 4D [1,4] Dayday[4]	MCPB Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target[1,4]
Creeping Red Fescue	Seeding	Poast Ultra[1]	2,4-D Attain 4D [1,4]	Basagran[1] Buctril MF	Dayday[4] Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target[1,4]
	Established	Assure II[1,4] Poast Ultra[1]	2,4-D Ally[4] Attain 4D [1,4]	Basagran[1] Dayday[4] Infinity	MCPB Curtail[1] Prestige 4D[1]	Refine SG Spectrum[1] Target[1,4]	
Tall Fescue	Seeding		2,4-D Attain 4D [1,4]	Buctril MF[4] Dayday[4]	Curtail[1] Refine SG	Spectrum[1]	
	Established		2,4-D Attain 4D [1,4]	Dayday[4] Curtail[1]	Prestige 4D[1] Refine SG	Spectrum[1] Target[1,4]	
Orchard Grass	Seeding		2,4-D Basagran[1]	Buctril MF[4]	Dayday[4]	Refine SG	Target[1,4]
	Established		2,4-D	Ally[4]	Dayday[4]	Refine SG	Target[1,4]
Timothy	Seeding		2,4-D Attain 4D [1,4] Basagran[1]	Buctril MF[4] Curtail MF Infinity[1]	Curtail[1] Pardner[4] Prestige 4D[1]	Spectrum[1] Target[1,4]	
	Established		2,4-D Ally[4] Attain 4D [1,4]	Basagran[1] Buctril MF[4] Curtail MF	MCPB Curtail[1] Prestige 4D[1]	Spectrum[1] Target[1,4]	
Hay and Grazing	With Legumes	Amitrol 240	Embutox[4]	Trigatox Plus[4]			
	No Legumes	Amitrol 240	2,4-D	Embutox[4]	MCPB	Trigatox Plus[4]	

[1] Other similar products can be found listed under this product
[2] Suppression only
[3] Pre plant incorporate treatment
[4] Used as crop dessicant
[5] Under irrigation only
[6] Seed production only
[7] Undersowing only
[8] Forage production only
[9] Fall applications only

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Broadleaf Weeds				Grasses (Suppression/Control)		
Alfalfa/ Bromegrass	Seedling	Attain 4E[1,4]	Capreno[2]	2,4-D Ester[3]	Refine 70	Prestige 4E[1]		
	Established	Attain 4E[1,4] Raptor[1,4]	Refine 70	Infinity[1]	Target[1,4]	Prestige 4E[1]		
Clearfield Bromegrass	Seedling	2,4-D Attain 4E[1,4] Resolute[4]	Accent 6F[1,4] Raptor[1] 2,4-D Ester[3]	Nucleus[1,4] Refine 70	Target[1,4]	Accent 6F[1] Lontrel	Nucleus[1,4]	Prestige 4E[1]
	Established	2,4-D Attain 4E[1,4]	Raptor[1] Infinity[1]	2,4-D Ester[3] Refine 70	Target[1,4]	Lontrel	Prestige 4E[1]	
Crested/ Rhizomegrass	Seedling	2,4-D Attain 4E[1,4] Resolute[4]	Accent 6F[1,4] Raptor[1] 2,4-D Ester[3]	Nucleus[1,4] Refine 70	Target[1,4]	Accent 6F[1] Lontrel	Nucleus[1,4]	Prestige 4E[1]
	Established	2,4-D Ally[4] Rez[4]	Attain 4E[1,4] Raptor[1]	2,4-D Ester[3] Refine 70	Target[1,4]	Ally[4]	Lontrel	Prestige 4E[1]
Intermediate/ Rhizomegrass	Seedling	2,4-D Attain 4E[1,4]	Accent 6F[1,4] Raptor[1]	2,4-D Ester[3] Nucleus[1,4]	Refine 70 Target[1,4]	Accent 6F[1] Lontrel	Lontrel Nucleus[1]	Prestige 4E[1]
	Established	2,4-D Ally[4] Rez[4]	Attain 4E[1,4] Raptor[1]	2,4-D Ester[3] Refine 70	Target[1,4]	Ally[4]	Lontrel	Prestige 4E[1]
Creeping Red Fescue	Seedling	2,4-D Attain 4E[1,4] Resolute[4]	Accent 6F[1,4] Raptor[1] 2,4-D Ester[3]	Nucleus[1,4] Refine 70	Target[1,4]	Accent 6F[1] Lontrel	Nucleus[1,4]	Prestige 4E[1]
	Established	2,4-D Ally[4] Rez[4]	Attain 4E[1,4] Raptor[1]	Infinity[1] 2,4-D Ester[3]	Refine 70 Target[1,4]	Ally[4]	Lontrel	Prestige 4E[1]
Tall Fescue	Seedling	2,4-D Attain 4E[1,4]	Accent 6F[1,4] Raptor[1]	2,4-D Ester[3]	Refine 70	Accent 6F[1]	Lontrel	
	Established	2,4-D Attain 4E[1,4]	Raptor[1] 2,4-D Ester[3]	Refine 70	Target[1,4]	Lontrel	Prestige 4E[1]	
Orchard Grass	Seedling	2,4-D Resolute[4]	Accent 6F[1,4] Raptor[1]	Nucleus[1,4] Refine 70	Target[1,4]	Accent 6F[1]	Lontrel	Nucleus[1,4]
	Established	2,4-D Ally[4] Rez[4]	Raptor[1]	Refine 70	Target[1,4]	Ally[4]	Lontrel	
Timothy	Seedling	2,4-D Attain 4E[1,4]	Resolute[4] Accent 6F[1,4]	2,4-D Ester[3] Infinity[1]	Nucleus[1,4] Target[1,4]	Accent 6F[1] Lontrel 3E	Lontrel Nucleus[1,4]	Prestige 4E[1]
	Established	2,4-D	Attain 4E[1,4]	Accent 6F[1,4]	Target[1,4]	Ally[4] Accent 6F	Lontrel 3E Lontrel	Prestige 4E[1]
Hay and Grazing	Until regrowth							
	Re-regrowth	2,4-D	Curtail	Target[1,4]		Curtail	Lontrel	Turflon Ester

1. Other similar products can be found listed under this product.
2. Suppression only.
3. Pre-plant incorporate treatment.
4. Used as crop dessicant.
5. Under irrigation only.
6. Seed production only.
7. Undersowing only.
8. Forage production only.
9. Fall application only.

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Herbicide Selector Chart – Forage Grasses

Crop	Crop Stage	Weeds Controlled				
Alfalfa, Pinto peanuts	Seedling	Many annuals[1] Kochia[2]	Annual bluegrass[3] Jointed goatgrass[4]	Tansy ragwort[5]	Many broadleaf weeds	Downy brome[6]
	Established	Many annuals[1] Kochia[2] Canada thistle	Annual bluegrass[3] Jointed goatgrass[4]	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6]	Foxtail[7]
Clovers, Perennial peanuts	Seedling	Annual bluegrass[3] Many annuals[1] Pennycress[8]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3] Mustard	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
	Established	Annual bluegrass[3] Many annuals[1]	Jointed goatgrass[4] Kochia[2]	Mustard Many broadleaf weeds	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
Crownvetch, Birdsfoot trefoil	Seedling	Annual bluegrass[3] Many annuals[1] Pennycress[8]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3] Mustard	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
	Established	Annual bluegrass[3] Many annuals[1] Mustard	Many annuals[1] Kochia[2]	Mustard Many broadleaf weeds	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
Lespedeza, Kudzu	Seedling	Annual bluegrass[3] Many annuals[1]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3] Mustard	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
	Established	Annual bluegrass[3] Many annuals[1] Mustard	Many annuals[1] Kochia[2]	Mustard Many broadleaf weeds	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
Trefoils, Wild Peanuts	Seedling	Annual bluegrass[3] Many annuals[1] Pennycress[8]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3] Mustard	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
	Established	Annual bluegrass[3] Mustard Many annuals[1]	Kochia[2] Jointed goatgrass[4]	Mustard Many broadleaf weeds	Tansy ragwort[5] Many broadleaf weeds	Downy brome[6] Foxtail[7]
Wild Peanuts	Seedling	Annual bluegrass[3] Many annuals[1]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3] Mustard	Many broadleaf weeds	Downy brome[6]
	Established	Annual bluegrass[3] Many annuals[1]	Kochia[2] Jointed goatgrass[4]	Mustard Foxtail[7]	Many broadleaf weeds	Foxtail[7]
Birdsfoot trefoil	Seedling	Annual bluegrass[3] Pennycress[8]	Jointed goatgrass[4] Kochia[2]	Annual bluegrass[3]	Many broadleaf weeds	Downy brome[6]
	Established	Annual bluegrass[3] Mustard	Kochia[2]	Annual bluegrass[3]	Many broadleaf weeds	Foxtail[7]
Clovers, Perennial peanuts	Seedling	Annual bluegrass[3] Many annuals[1] Pennycress[8]	Jointed goatgrass[4] Jointed goatgrass[4]	Annual bluegrass[3] Annual bluegrass[3]	Tansy ragwort[5] Tansy ragwort[5]	Downy brome[6] Foxtail[7]
	Established	Annual bluegrass[3] Mustard Many annuals[1]	Many annuals[1] Jointed goatgrass[4]	Jointed goatgrass[4] Annual bluegrass[3]	Mustard Tansy ragwort[5]	Downy brome[6] Foxtail[7]
Hay and Pasture	Alfalfa Legumes Pea legumes	Mustards[9] Many annuals[1]	Kochia, Tansy ragwort[5] Jointed goatgrass[4]	Annual bluegrass[3]	Tansy ragwort[5]	

[1] Other annual broadleaf weeds are not found listed under this section.
[2] Suppression only.
[3] For winter annual grass suppression.
[4] Will not stop Jointed.
[5] Will suppress only.
[6] Will suppress only.
[7] Will suppress only.
[8] Pennycress only.
[9] Wild mustard only.

Herbicide Selection Chart : Orange Grasses

Quaternary Extinction Event – Other Fungi

[illegible]

Herbicide Selector Chart – Other Crops

Crop	Pre-Weeds		Common Chickweed		Common Groundsel		Corn Spurrey
Beans Check label	Aura[1] Basagran[1]	Flexidor	Basagran[1] Edge Cytoro	Flexidor Tribunil[1]	Basagran[1] Flexidor		Aura[1] Basagran[1] Edge Cytoro Flexidor
Canary Seed	Bushid W[1] Pardner[1]	Trophy[1]	Prestige XC		Bushid W[1] Curtail M	Pardner[1]	Starane 2[1] Target[1]
Chickpeas	Aura[1]		Cadence				Aura[1] Cadence
Field Corn	2,4-D Aura[1] Basagran[1] Bushid W[1] Distinct Sylvite 20g	MCPA amine MCPA K salt MCPA Na salt Pardner[1] Flexidor	2,4-D Armezon	Basagran[1] Flexidor	2,4-D Basagran[1] Bushid W[1]	Pardner[1] Flexidor	Aura[1] Starane 2[1] Basagran[1] Sylvite 20g Flexidor
Liberty Link Corn	Aura[1]	Liberty 200 SN	Liberty 200 SN				Aura[1]
Roundup Ready Corn	Aura[1] Claythosate Foramsulfa 3 Wiegmum	Prosaro Stine 7[1]	Armezon Claythosate Foramsulfa 3 Wiegmum	Prosaro Stine 7[1]			Aura[1] Claythosate
Soybean	Aura[1] Basagran[1] Bushid W[1]	Sylvite 20g Pardner[1]	Armezon Basagran[1]		Basagran[1] Bushid W[1]	Pardner[1]	Aura[1] Basagran[1] Sylvite 20g
Sunflowers	Basagran[1]		Basagran[1] Edge	Tribunil[1]	Basagran[1]		Basagran[1] Edge
Lentils	Aura[1]		Edge Odyssey[1]	Sencor Tribunil[1]			Aura[1] Edge Sencor
Peas Check label to ensure chosen chemical or mix is registered for use on this crop	Aura[1] Basagran[1]	MCPA amine MCPA Na salt	Basagran[1] Edge Odyssey	Avenal[1] Sencor Tribunil[1]	Basagran[1]		Aura[1] Basagran[1] Edge Sencor
Potatoes (irrigated)	Aura[1]		Cytoro	Sencor Titus Pro			Aura[1] Cytoro Sencor Titus Pro

[1] Other crop products can be found listed under this product
[2] Suppression only
[3] For emergence to crop, post-emergent to weeds
[4] Check on crop database
[5] CLEARFIELD tolerant lentils only
[6] Non-CLEARFIELD varieties
[7] To be used pre-seed or pre-emergence, as a burndt

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Herbicide Selector Chart – Other Crops

Crop	Cow Cockle		Green Foxtail		Hairy Nightshade	Hemp-nettle
Beans Check label	Edge Solo	Trifluralin*	Accurate II* Dual II Magnum Edge Eptam	Poast Ultra Select* Solo Trifluralin*	Aim† Basagran* Eptam Pursuit*	Edge† Eptam
Canary Seed	Banvel II* Buctril M* Guillotine†	Pardner* Target*				Prestige XC† Target* Trophy*
Chickpeas			Accurate II* Poast Ultra	Select*	Aim†	Sencor
Field Corn	Banvel II* Buctril M* DyVel DSp	Guillotine† Pardner*	Accent Dual II Magnum Focus†	Primextra II Magnum	Aim† Basagran*	MCPA Amine† MCPA K-salt† MCPA Na-salt† Tropotox Plus†*
Liberty Link Corn	Guillotine†		Liberty 200 SN			
Roundup Ready Corn	Glyphosate Guillotine† Primextra II Magnum	Princep Stine T*	Glyphosate Primextra II Magnum	Princep Stine T*	Aim† Glyphosate	Glyphosate
Sweet Corn	Buctril M* DyVel DSp	Guillotine† Pardner*	Accent Dual II Magnum		Aim† Basagran*	
Fababeans	Edge	Trifluralin*	Accurate II Edge	Poast Ultra Trifluralin*	Basagran*	Edge
Lentils	Edge Solo†	Trifluralin*	Accurate II* Odyssey† Poast Ultra	Select* Solo† Trifluralin*	Aim†	Ares† Edge Odyssey† Sencor
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Edge Guillotine† Solo	Trifluralin* Viper	Accurate II* Chateau*‡ † Edge Odyssey Poast Ultra	Pursuit* Select* Solo Trifluralin* Viper	Aim† Basagran* Chateau*‡	Edge† MCPA Amine† MCPA Na-salt† Odyssey† Pursuit* Sencor Tropotox Plus†*
Potatoes Irrigated (Int)			Chateau*‡ † Dual II Magnum Eptam Poast Ultra	Prism (int) Select* Titus Pro	Aim† Chateau*‡ Eptam	Sencor Titus Pro

* Other similar products can be found listed under this product.
† Suppression only
‡ Pre emergence to crop, post emergent to weeds
§ Used as crop desiccant
¶ CLEARFIELD tolerant lentils only
# Non CLEARFIELD varieties
** To be used pre seed or pre emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Knotweed	Kochia		Lamb's-quarters		
Beans Check label	Trifluralin*	Aim[2]	Edge	Aim[2] Basagran* Edge	Eptam Permit Solo	Trifluralin*
Canary Seed	Target*	Buctril M* Goldwing[7] Heat[6] Pardner*	Prestige XC Target* Trophy*	Buctril M* Curtail M Goldwing[7]	Heat[6] Pardner* Prestige XC	Target* Trophy*
Chickpeas		Aim[2] Authority*[1]	Heat[6]	Aim[2] Sencor	Authority*[1]	Heat[6]
Field Corn	2,4-D DyVel DSp	2,4-D Aim[2] Buctril M* Distinct DyVel DSp	Goldwing[7] Heat[6] MCPA amine MCPA K-salt Pardner*	2,4-D Aatrex Liquid 480 Aim[2] Armezon Basagran* Buctril M* Distinct DyVel DSp	Embutox* Goldwing[7] Heat[6] MCPA amine MCPA K salt MCPA Na-salt Pardner*	Permit Primextra II Magnum Princep Nine-T* Tropotox Plus*
Liberty Link Corn		Aim[2]	Goldwing[7]	Aim[2]	Goldwing[7]	
Roundup Ready Corn		Aim[2] Glyphosate	Goldwing[7]	Aim[2] Armezon	Glyphosate Goldwing[7]	
Sweet Corn	DyVel DSp	Buctril M* DyVel DSp	Goldwing[7] Pardner*	Aatrex Liquid 480 Aim[2] Armezon	Basagran* Buctril M* DyVel DSp	Goldwing[7] Pardner*
Fababeans	Trifluralin*	Edge		Basagran*	Edge	Trifluralin*
Lentils	Trifluralin*	Aim[2] Edge Heat[6]	Odyssey[1,5] Solo[1,5]	Ares[5] Aim[2] Heat[6]	Odyssey[1,5] Sencor Solo[5]	Trifluralin*
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Trifluralin*	Aim[2] Authority*[1] Chateau*[4,5] Edge Goldwing[7]	Heat[6] MCPA amine Odyssey[1] Solo[1] Viper[1]	Aim[2] Authority*[1] Basagran* Chateau*[4,5] Edge Goldwing[7]	Heat[6] MCPA amine MCPA Na-salt Odyssey[1] Sencor	Solo Trifluralin* Tropotox Plus* Viper
Potatoes irrigated (irr)		Aim[2]	Chateau*[4,5]	Aim[2] Chateau*[4,5]	Eptam Prism[1] (irr)	Sencor

* Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as crop desiccant
[4] CLEARFIELD tolerant lentils only
[5] Non-CLEARFIELD varieties
[6] To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Mustards			Night-flowering Catchfly	Perennial Sow-thistle	
Beans Check label	Aim[6] Basagran[♦]	Permit	Solo			
Canary Seed	Banvel II[♦] Buctril M[♦]	Goldwing[2] Pardner[♦]	Target[♦] Trophy[♦]	Buctril M[♦] Goldwing[2] Target[♦]	Banvel II[1♦] Buctril M[♦,1] Curtail M	Prestige XC Target[♦1]
Chickpeas	Aim[6]	Sencor				
Field Corn	2,4-D Aim[6] Aatrex Liquid 480 Armezon Basagran[♦] Banvel II[♦]	Buctril M[♦] DyVel DSp Embutox[♦] Goldwing[2] MCPA amine MCPA K-salt	MCPA Na-salt Pardner[♦] Permit Primextra II Magnum Tropotox Plus[♦]	Buctril M[♦] Goldwing[2]	Banvel II[1,♦] Buctril M[1,♦] Embutox[♦] MCPA Amine[1]	MCPA K-salt[1] MCPA Na-salt[1] Princep Nine-T[♦] Tropotox Plus[1,♦]
Liberty Link Corn	Aim[6]	Goldwing[2]	Liberty 200 SN	Goldwing[2]	Liberty 200 SN	
Roundup Ready Corn	Aim[6] Armezon	Glyphosate Goldwing[2]		Glyphosate Goldwing[2]	Glyphosate	
Sweet Corn	Aatrex Liquid 480 Aim[6] Armezon	Basagran[♦] Buctril M[♦] DyVel DSp	Goldwing[2] Pardner[♦]	Buctril M[♦] Goldwing[2]	Buctril M[1,♦]	
Fababeans	Basagran[♦]					
Lentils	Ares[4] Aim[6]	Odyssey[4] Sencor[1]				
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Basagran[♦] Goldwing[2] MCPA amine	MCPA Na-salt Odyssey Pursuit[♦] Sencor	Solo Tropotox Plus[♦] Viper	Goldwing[2]	MCPA Amine[1] MCPA Na-salt[1]	Tropotox Plus[1,♦]
Potatoes Irrigated (irr)	Aim[6]	Sencor	Titus Pro			

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-emergence to crop, post-emergent to weeds
3 Used as crop desiccant
4 CLEARFIELD tolerant lentils only
5 Non-CLEARFIELD varieties
6 To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Persian Darnel		Prostrate Pigweed	Purslane		Quack Grass	
Beans Check label	Poast Ultra Select♦	Trifluralin♦	Aim[6] Edge Eptam	Aim[6] Edge Eptam	Permit Trifluralin♦	Assure II♦ Eptam	Poast Ultra Select♦
Canary Seed			Target♦				
Chickpeas	Poast Ultra	Select♦	Aim[6]	Aim[6]		Assure II♦	Select♦
Field Corn Check label to ensure chosen chemical or mix is registered for use on the crop			2,4-D Aim[6] DyVel DSp MCPA K-salt Primextra II Magnum	2,4-D Aatrex Liquid 480 Aim[6] Basagran♦ MCPA amine MCPA K-salt	MCPA Na-salt Permit Primextra II Magnum Princep Nine-T♦	Accent	
Liberty Link Corn			Aim[6]	Aim[6]		Liberty 200 SN	
Roundup Ready Corn			Aim[6]	Aim[6]		Glyphosate	
Sweet Corn			Aim[6]	Aatrex Nine-0 Aim[6]	Basagran♦	Accent	
Fababeans	Edge Poast Ultra	Trifluralin♦	Edge	Basagran♦ Edge	Trifluralin♦	Assure II	
Lentils	Ares[4] Odyssey[4] Poast Ultra	Select♦ Solo[4] Trifluralin♦	Aim[6] Edge	Aim[6] Edge	Trifluralin♦	Assure II♦ Poast Ultra	Select♦
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Odyssey Poast Ultra Select♦	Trifluralin♦ Viper	Aim[6] Edge	Aim[6] Basagran♦ Edge	MCPA amine MCPA Na-salt Trifluralin♦	Assure II♦ Poast Ultra	Select♦
Potatoes Irrigated (irr)	Poast Ultra	Select♦	Aim[6] Eptam	Aim[6]	Eptam	Eptam Poast Ultra	Prism (irr) Select♦ Titus Pro

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as crop desiccant
[4] CLEARFIELD tolerant lentils only
[5] Non-CLEARFIELD varieties
[6] To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Redroot Pigweed		Russian Thistle		Shepherd's Purse	
Beans Check label	Aim[6] Basagran[1,♦] Dual II Magnum Edge	Eptam Solo Permit Trifluralin[♦]	Basagran[♦,1]	Edge[2]	Basagran[♦] Permit Solo	
Canary Seed	Banvel II[♦] Basagran[1,♦] Buctril M[♦] Curtail M Goldwing[2]	Heat[6] Prestige XC Target[♦] Trophy[♦]	Buctril M[♦] Pardner[♦]	Target[♦]	Buctril M[♦] Curtail M Prestige XC	Target[♦] Trophy[♦]
Chickpeas	Aim[6] Authority[♦,2]	Heat[6]				
Field Corn	2,4-D Aatrex Liquid 480 Aim[6] Armezon Banvel II[♦] Basagran[♦,1] Buctril M[♦] Distinct Dual II Magnum[1] DyVel DSp Embutox[♦]	Focus[2] Goldwing[2] Heat[6] MCPA amine MCPA K-salt MCPA Na-salt Permit Primextra II Magnum Tropotox Plus[♦]	2,4-D Basagran[1,♦] Buctril M[♦]	DyVel DSp Pardner[♦]	2,4-D Basagran[♦] Buctril M[♦] DyVel DSp Embutox[♦]	MCPA amine MCPA K-salts MCPA Na-salt Permit Tropotox Plus[♦]
Liberty Link Corn	Aim[6] Goldwing[2]	Liberty 200 SN			Liberty 200 SN	
Roundup Ready Corn	Aim[6] Armezon	Glyphosate Goldwing[2]	Glyphosate			
Sweet Corn	Aatrex Liquid 480 Aim[6] Armezon Basagran[♦,1] Buctril M[♦]	Dual II DyVel DSp Goldwing[2] Magnum[1,2]	Basagran[1,♦] Buctril M[♦]	DyVel DSp Pardner[♦]	Basagran[♦] Buctril M[♦]	DyVel DSp
Fababeans	Basagran[1,♦]	Edge	Basagran[1,♦]	Edge	Basagran[♦]	
Lentils	Ares[4] Aim[6] Edge	Heat[6] Odyssey[4] Solo[5]	Ares[4] Odyssey[4]	Reglone[3] Sencor	Ares[4] Odyssey[4]	Solo[5]
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Authority[♦,2] Basagran[1,♦] Chateau[♦,6] Edge Goldwing[2] Heat[6]	MCPA amine MCPA Na-salt Odyssey Pursuit[♦] Solo Tropotox Plus[♦] Viper	Basagran[1,♦] Edge[1]	Odyssey Viper	Basagran[♦] MCPA amine MCPA Na-salt Odyssey	Pursuit[♦] Solo Tropotox Plus[♦] Viper
Potatoes Irrigated (irr)	Aim[6] Chateau[♦,6] Dual II Magnum Eptam	Prism (irr) Sencor Titus Pro			Sencor Titus Pro	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-emergence to crop, post-emergent to weeds
3 Used as crop desiccant
4 CLEARFIELD tolerant lentils only
5 Non-CLEARFIELD varieties
6 To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Stinkweed		Tartary Buckwheat		Volunteer Canola		Volunteer Oats	
Beans Check label	Aim[2] Basagran[a]	Solo			Assure II[a] Edge[1] Eptam	Poast Ultra Select[a] Solo	Assure II[a] Eptam Poast Ultra	Select[a] Solo
Canary Seed	Buctril M[a] Curtail M Goldwing[2] Heat[2]	Pardner[a] Prestige XC Target[a] Trophy[a]	Banvel II[a] Buctril M[a] Curtail M	Pardner[a] Prestige XC Target[a]				
Chickpeas	Aim[2] Sencor	Heat[2]	Sencor		Assure II[a] Poast Ultra	Select[a]	Assure II[a] Poast Ultra	Select[a]
Field Corn	Aim[2] Basagran[a] Buctril M[a] 2,4-D DyVel DSp Embutox[a] Goldwing[2]	Heat[2] MCPA amine MCPA K-salt MCPA Na-salt Pardner[a] Tropotox Plus[a]	Banvel II[a] Buctril M[a] DyVel DSp MCPA Amine[1]	MCPA K-salt[1] MCPA Na-salt[1] Pardner[a]				
Liberty Link Corn	Aim[2] Goldwing[2]	Liberty 200 SN						
Roundup Ready Corn	Aim[2] Glyphosate	Goldwing[2]			Glyphosate		Glyphosate	
Sweet Corn	Aim[2] Basagran[a] Buctril M[a]	DyVel DSp Goldwing[2] Pardner[a]	Buctril M[a] DyVel DSp Pardner[a]					
Fababeans	Basagran[a]				Assure II Edge Poast Ultra		Assure II Poast Ultra	
Lentils	Ares[1] Aim[2] Heat[2]	Odyssey[a] Sencor Solo[a]	Sencor		Ares[1] Assure II[a] Edge Odyssey[a]	Poast Ultra Select[a] Solo[a]	Ares[1] Assure II[a] Odyssey[a]	Poast Ultra Select[a] Solo[a]
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[2] Basagran[a] Goldwing[2] Heat[2] MCPA amine MCPA Na-salt Odyssey	Pursuit[a] Sencor Solo Tropotox Plus[a] Viper	MCPA Amine[1] MCPA Na-salt[1] Sencor		Assure II[a] Edge[1] Odyssey[a] Poast Ultra	Pursuit[1,a] Select[a] Solo Viper[1]	Assure II[a] Odyssey Poast Ultra	Select[a] Solo Viper
Potatoes **Irrigated** (lm)	Aim[2] Sencor	Titus Pro	Sencor Titus Pro		Eptam Poast Ultra	Select[a]	Eptam Poast Ultra	Select[a]

[a] Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as crop desiccant
[4] CLEARFIELD tolerant lentils only
[5] Non-CLEARFIELD varieties
[6] To be used pre-seed or pre-emergence, as a burnoff.

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Herbicide Selector Chart – Other Crops

Crop	Volunteer Canola		Wild Buckwheat		Wild Oats		Wild Radish
Beans Check label	Assert Basagran* Solo		Edge Solo Trifluralin*		Assure II* Edge Cyborg Poast Ultra	Select* Solo Trifluralin*	Basagran* Pursuit
Canary Seed	Buctril M* Curtail M Goldwing* Heat*	Prestige XC Target* Trophy*	Banvel II* Buctril M* Curtail M Goldwing* Heat*	Tordon* Prestige XC Target* Trophy*			Trophy*
Chickpeas	Assert Sencor	Heat*	Authority*,1 Heat*		Assure II* Poast Ultra	Select*	
Field Corn	2,4-D Assert Armezon Basagran* Buctril M*	Distinct Dyfeat 22g Goldwing* Heat* Trooper Plus*	2,4-D Atrex Liquid 480 Banvel II* Buctril M* Dyfeat 22g Embutox* Distinct	Goldwing* Heat* MCPA Amine* MCPA K salt* MCPA Na salt* Pardner* Prowag Xtra 2**	Atrex Liquid 480 Assert	Prowag Xtra 2**	Basagran* 2,4-D MCPA amine MCPA K salt MCPA Na salt Permit Trooper Plus*
Liberty Link Corn	Assert	Goldwing*	Liberty 200 SN	Goldwing*	Liberty 200 SN		
Roundup Ready Corn	Assert Armezon	Glyphosate Goldwing*	Glyphosate	Goldwing*	Glyphosate		
Sweet Corn	Armezon Basagran* Buctril M*	Dyfeat 22g Goldwing*	Atrex Liquid 480 Buctril M* Dyfeat 22g	Goldwing* Pardner*	Atrex Liquid 480		Basagran*
Fallow/Summer	Basagran*		Edge	Trifluralin*	Assure II Edge	Poast Ultra Trifluralin*	Basagran*
Lentils	Arex* Assert Heat*	Odyssey* Sencor Solo*,1	Arex* Edge Heat*	Odyssey* Solo*,1 Trifluralin*	Arex* Assure II* Edge Odyssey*	Poast Ultra Select* Solo* Trifluralin*	
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Assert Basagran* Goldwing* Heat* Odyssey*	Pursuit*,4 Sencor Solo* Trooper Plus Viper	Authority*,1 Edge Goldwing* Heat* MCPA Amine* MCPA Na salt*	Odyssey* Pursuit*,4 Solo* Trifluralin* Viper*	Assure II* Avadex BW Edge Odyssey Poast Ultra	Pursuit Select* Solo Trifluralin* Viper	Basagran* MCPA amine MCPA Na salt Trooper Plus*
Potatoes Irrigated (Int)	Assert Sencor	Titus Pro			Cyborg Poast Ultra	Select*	

* Other similar products can be found listed under this product.
1 Suppression only
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5 Non-CLEARFIELD varieties
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Active ingredient names for registered products can be found in the *Insecticide Group Classification by Mode of Action* table starting on page 366

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Chemical Insect Control in Alberta

The degree of infestation and severity of insect damage varies drastically from one to one and another to another. Most years, such as grasshoppers, cutworms and Bertha armyworms, require control during periods of abundance that may last three out to several years. Other years, like this hoppers, require control annually in some parts of Alberta.

Chemical control

A number of factors should be considered over the decision to apply an insecticide has been made. Insecticides will kill the pest insects if applied properly at a stage when the pest is susceptible. An application made too early or too late in the life cycle may not provide adequate control. Other factors to consider include: ability of the insecticide to penetrate through the plant foliage, weather conditions, age and size of the insect, and period to grazing or harvest and forage regulated. If insects are causing new crops or emerging over an extended period, several applications to the same crop may be necessary. Most new insecticides have limited residual properties when applied to foliage.

Safety

In general, insecticides are more toxic to humans, wildlife, fish, bees and other non-target organisms than herbicides or fungicides. Follow label directions for safety precautions associated with application of each insecticide. Refer to the introductory section of this book for general information on safety precautions associated with pesticide use.

Bee safety

The insecticides used to protect crops from damaging outbreaks of insect pests can also kill beneficial insects. The objective of the insecticide application is to remove the problem insects from the crop with the least possible impact to beneficial insects such as honeybees and leafcutter bees. Because bees play a critical role in pollinating certain crops, it is important to ensure that an insecticide application has a minimum impact on population numbers. Although it may not be possible to totally eliminate the effect of insecticides on beneficial insects, the impact can be greatly reduced when the agricultural producer, pesticide applicator and beekeeper work together.

Beekeepers should:

- Talk with the landowners near their bee yards before spray season and provide the producers with their phone numbers.
- Ask producers if spraying in nearby insects is likely that year.
- Ask the producer to provide them with notification 48 hours in advance of applying an insecticide.

Producers and applicators should:

- Check for potential insect infestations at field crops early and frequently and determine the economic threshold for problem insects so that a spray program can be planned should it be required.
- Notify beekeepers of intentions to spray 48 hours in advance of spraying.
- Avoid applications of insecticides to crops in bloom or to fields containing blooming weeds, which are attractive to foraging bees. Where feasible, use a preventative program early in the season when insecticides may be an effective and crops are not blooming.
- Spray late in the day or early in the morning when the temperature is cool or when foraging temperatures to reduce direct exposure to bees. Insecticides are most active when the temperature is above 18°C (70°F), usually in the heat of the day. As a general rule, morning applications are less hazardous than evening applications.
- Where there is a risk to bees, use an insecticide that has short residual activity to reduce the impact on the bees and to reduce possibilities of residues occurring in honey and pollen.
- Learn about pollination requirements of the different crops grown and direct beekeepers and landowners there.

Caution

Generally low temperatures during and immediately following application cause insecticides to remain toxic to bees for a much longer period than normal. High temperatures will cause the foraging periods and application time more to adjacent surroundings. Several insecticides (true drifting into adjacent blooming crops, orchards and gardens with results in illness, death and by bees. Beekeepers should be advised to maintaining a reasonable distance from field boundaries and allowing for the prevailed

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assessment of insecticides for weed. For more information, contact the relevant agricultural chemical distributor.

Rights and good practice

Be sure you only purchase what you intend to use. You must apply the product only for the purpose specified on the label, following all directions, precautions and restraints. Some uses are illegal. It is an offence to use the product in a manner that may cause unacceptable risk to people, other animals, crops, or the environment. It is an offence to fail to follow the directions on the label. You must keep the product in the original container, clearly labelled. Take all reasonable precautions to protect people and non-target animals, plants and the environment from harm caused by exposure to the product. Do not apply the product when there is a likelihood of it drifting onto neighbouring properties, when it may be taken or blown by wind, rain or irrigation onto areas beyond the target area, or when it may result in unacceptable residues in marketable crops. You must not apply the product after the period stated on the label before harvesting, grazing or cutting for stock food. You must comply with any other restrictions on the label.

Users of agricultural chemicals in Australia are required by law to comply with the directions on the label and with any restrictions imposed by the relevant state or territory pesticide legislation. Some uses listed on the label may be illegal in some states or territories. Always read the label before using the product and strictly observe all safety directions. You must also observe all relevant regulations and requirements regarding the storage, handling and disposal of the product and its containers. Always wear the protective clothing and equipment specified on the label when handling the product. Take all reasonable precautions to protect plants not to be harmed by the product from accidental exposure to it. Do not apply the product if it is likely to contaminate water, except as permitted on the label. Do not clean application equipment or dispose of unwanted product or containers in a manner that may pollute waterways or the environment. Observe withholding periods listed on the label. Record details of all applications of the product as required by relevant legislation.

Some agricultural chemicals are subject to restrictions on their use when used to produce food for export. Additional restrictions may be imposed by importing countries on residues in food derived from animals or plants treated with agricultural chemicals. Consult the relevant authority in the country to which you intend to export produce for advice on permissible residue levels.

Manufacturers sometimes claim that chemicals are identified under a number of trade names in order to gain access to different markets. Applicators must be certified to use some products. Always read the label before using any chemical product. Use only the amount recommended. Apply chemicals only when conditions are favourable to minimise drift. Avoid spraying when there is any chance of rain. Do not apply chemicals when there is a likelihood of spray drift onto neighbouring properties. Always keep chemicals in their original containers with labels clearly visible. Dispose of empty containers according to label directions. Never re-use containers for any purpose. Triple rinse containers before disposal. Add rinsings to the spray tank. Do not dispose of containers in a manner likely to cause pollution. Never dispose of containers where they may contaminate crops, pastures, dams or waterways. Do not burn containers. Do not allow livestock access to containers. Store containers safely out of the reach of children. Do not re-use containers for any purpose. Triple rinse containers before disposal. Add rinsings to the spray tank. Do not dispose of containers in a manner likely to cause pollution. Never dispose of containers where they may contaminate crops, pastures, dams or waterways. Do not burn containers. Do not allow livestock access to containers. Store containers safely out of the reach of children. Do not re-use containers for any purpose.

Some chemicals are harmful to bees. Do not apply chemicals when bees are foraging. Do not apply chemicals when there is a likelihood of spray drift onto flowering crops. Do not apply chemicals when there is a likelihood of spray drift onto flowering weeds. Do not apply chemicals when there is a likelihood of spray drift onto beehives. Do not apply chemicals when there is a likelihood of spray drift onto bee forage. Do not apply chemicals when there is a likelihood of spray drift onto bee pollen. Do not apply chemicals when there is a likelihood of spray drift onto bee nectar. Do not apply chemicals when there is a likelihood of spray drift onto bee wax. Do not apply chemicals when there is a likelihood of spray drift onto bee propolis. Do not apply chemicals when there is a likelihood of spray drift onto bee royal jelly. Do not apply chemicals when there is a likelihood of spray drift onto bee venom. Do not apply chemicals when there is a likelihood of spray drift onto bee products. Do not apply chemicals when there is a likelihood of spray drift onto bee by-products. Do not apply chemicals when there is a likelihood of spray drift onto bee waste. Do not apply chemicals when there is a likelihood of spray drift onto bee residues. Do not apply chemicals when there is a likelihood of spray drift onto bee contaminants. Do not apply chemicals when there is a likelihood of spray drift onto bee pollutants. Do not apply chemicals when there is a likelihood of spray drift onto bee toxins. Do not apply chemicals when there is a likelihood of spray drift onto bee poisons. Do not apply chemicals when there is a likelihood of spray drift onto bee hazards. Do not apply chemicals when there is a likelihood of spray drift onto bee risks. Do not apply chemicals when there is a likelihood of spray drift onto bee dangers. Do not apply chemicals when there is a likelihood of spray drift onto bee threats. Do not apply chemicals when there is a likelihood of spray drift onto bee perils. Do not apply chemicals when there is a likelihood of spray drift onto bee menaces. Do not apply chemicals when there is a likelihood of spray drift onto bee scourges. Do not apply chemicals when there is a likelihood of spray drift onto bee plagues. Do not apply chemicals when there is a likelihood of spray drift onto bee afflictions. Do not apply chemicals when there is a likelihood of spray drift onto bee tribulations. Do not apply chemicals when there is a likelihood of spray drift onto bee trials. Do not apply chemicals when there is a likelihood of spray drift onto bee ordeals. Do not apply chemicals when there is a likelihood of spray drift onto bee crosses. Do not apply chemicals when there is a likelihood of spray drift onto bee burdens. Do not apply chemicals when there is a likelihood of spray drift onto bee weights. Do not apply chemicals when there is a likelihood of spray drift onto bee loads. Do not apply chemicals when there is a likelihood of spray drift onto bee cargoes. Do not apply chemicals when there is a likelihood of spray drift onto bee freights. Do not apply chemicals when there is a likelihood of spray drift onto bee shipments. Do not apply chemicals when there is a likelihood of spray drift onto bee consignments. Do not apply chemicals when there is a likelihood of spray drift onto bee deliveries. Do not apply chemicals when there is a likelihood of spray drift onto bee transports. Do not apply chemicals when there is a likelihood of spray drift onto bee transportations. Do not apply chemicals when there is a likelihood of spray drift onto bee conveyances. Do not apply chemicals when there is a likelihood of spray drift onto bee vehicles. Do not apply chemicals when there is a likelihood of spray drift onto bee carriers. Do not apply chemicals when there is a likelihood of spray drift onto bee transporters. Do not apply chemicals when there is a likelihood of spray drift onto bee haulers. Do not apply chemicals when there is a likelihood of spray drift onto bee movers. Do not apply chemicals when there is a likelihood of spray drift onto bee shippers. Do not apply chemicals when there is a likelihood of spray drift onto bee consignors. Do not apply chemicals when there is a likelihood of spray drift onto bee consignees. Do not apply chemicals when there is a likelihood of spray drift onto bee recipients. Do not apply chemicals when there is a likelihood of spray drift onto bee receivers. Do not apply chemicals when there is a likelihood of spray drift onto bee handlers. Do not apply chemicals when there is a likelihood of spray drift onto bee operators. Do not apply chemicals when there is a likelihood of spray drift onto bee users. Do not apply chemicals when there is a likelihood of spray drift onto bee consumers. Do not apply chemicals when there is a likelihood of spray drift onto bee customers. Do not apply chemicals when there is a likelihood of spray drift onto bee clients. Do not apply chemicals when there is a likelihood of spray drift onto bee patrons. Do not apply chemicals when there is a likelihood of spray drift onto bee supporters. Do not apply chemicals when there is a likelihood of spray drift onto bee backers. Do not apply chemicals when there is a likelihood of spray drift onto bee sponsors. Do not apply chemicals when there is a likelihood of spray drift onto bee financiers. Do not apply chemicals when there is a likelihood of spray drift onto bee investors. Do not apply chemicals when there is a likelihood of spray drift onto bee shareholders. Do not apply chemicals when there is a likelihood of spray drift onto bee owners. Do not apply chemicals when there is a likelihood of spray drift onto bee proprietors. Do not apply chemicals when there is a likelihood of spray drift onto bee landlords. Do not apply chemicals when there is a likelihood of spray drift onto bee tenants. Do not apply chemicals when there is a likelihood of spray drift onto bee lessees. Do not apply chemicals when there is a likelihood of spray drift onto bee leaseholders. Do not apply chemicals when there is a likelihood of spray drift onto bee subtenants. Do not apply chemicals when there is a likelihood of spray drift onto bee sublessees. Do not apply chemicals when there is a likelihood of spray drift onto bee assignees. Do not apply chemicals when there is a likelihood of spray drift onto bee transferees. Do not apply chemicals when there is a likelihood of spray drift onto bee successors. Do not apply chemicals when there is a likelihood of spray drift onto bee heirs. Do not apply chemicals when there is a likelihood of spray drift onto bee beneficiaries. Do not apply chemicals when there is a likelihood of spray drift onto bee legatees. Do not apply chemicals when there is a likelihood of spray drift onto bee devisees. Do not apply chemicals when there is a likelihood of spray drift onto bee testators. Do not apply chemicals when there is a likelihood of spray drift onto bee testatrixes. Do not apply chemicals when there is a likelihood of spray drift onto bee executors. Do not apply chemicals when there is a likelihood of spray drift onto bee administrators. Do not apply chemicals when there is a likelihood of spray drift onto bee trustees. Do not apply chemicals when there is a likelihood of spray drift onto bee guardians. Do not apply chemicals when there is a likelihood of spray drift onto bee custodians. Do not apply chemicals when there is a likelihood of spray drift onto bee keepers. Do not apply chemicals when there is a likelihood of spray drift onto bee wardens. Do not apply chemicals when there is a likelihood of spray drift onto bee overseers. Do not apply chemicals when there is a likelihood of spray drift onto bee supervisors. Do not apply chemicals when there is a likelihood of spray drift onto bee managers. Do not apply chemicals when there is a likelihood of spray drift onto bee directors. Do not apply chemicals when there is a likelihood of spray drift onto bee officers. Do not apply chemicals when there is a likelihood of spray drift onto bee boards. Do not apply chemicals when there is a likelihood of spray drift onto bee committees. Do not apply chemicals when there is a likelihood of spray drift onto bee councils. Do not apply chemicals when there is a likelihood of spray drift onto bee assemblies. Do not apply chemicals when there is a likelihood of spray drift onto bee congresses. Do not apply chemicals when there is a likelihood of spray drift onto bee conventions. Do not apply chemicals when there is a likelihood of spray drift onto bee meetings. Do not apply chemicals when there is a likelihood of spray drift onto bee gatherings. Do not apply chemicals when there is a likelihood of spray drift onto bee assemblies. Do not apply chemicals when there is a likelihood of spray drift onto bee congresses. Do not apply chemicals when there is a likelihood of spray drift onto bee conventions. Do not apply chemicals when there is a likelihood of spray drift onto bee meetings. Do not apply chemicals when there is a likelihood of spray drift onto bee gatherings.

Some crops may be exposed to the following materials and shall only be used as directed here or within the label instructions	There are no registered insecticides for use on crops from this group at time of publication	Some crops may be exposed to the following materials and shall only be used as directed here or within the label instructions
Acaricides	Abamectin 2018	Lucerne
Alkenes	Amitraz 1999	Almonds 2018
Apis mellifera	Amitraz Apis 2008	Beans
Bees 2018	Bacillus	Tomato
Bifenazate	Diflubenzuron	
Bivalve	Dodecyl	
Bivalve 2020	Dodecyl	
Bivalve	Dodecyl	
Bivalve	Fluvalinate 2018	
Carbaryl	Formic	
Cattle 100	Formic 100	
Cattle	Formic 2020	
Cattle	Formic 2018	
Cattle	Formic 2018	
Cattle	Formic 2018

Investments and conditions

The condition of these licences is the application of the investments and borrowing. Holdings in the form of a mortgage agreement to the lender. Bank investments must be maintained in accounts charged conditions for long-term finance to part to withdraw. Deposits in connection.

The profit

The profit and investor, the value transactions, applicable the use or term loans for effects. Use of options investment or shares for current assets funds.

Borrowing thresholds

Where holdings, conditions to apply as loans profit, access to profit a share of the. Applications are and for a receivable condition for settlement to the. Legislative profits value of the. Loss, the questions would to thresholds, whereby the loans of purchase with value a profit for payment. For share value the. Use of to assets. The investment, the bonds shares shares with years to, settling the decisions.

Receivable are agree on the investors of finance to loan of warranty, credit as to agree a or to use to the market. May as with to to receipts. The warranty of borrowings creditors. Provisions require of guarantee, and information when conditions value of to amount the borrowers to to. Borrowings to a value the agreement with conditions of. For accounts to. With value to whether as borrowings information assets.

Table 1: Thresholds for loans funds and receipts		
Value	Accounts thresholds	Loan rates
Debt assets	Debt to as loan. Thresholds and assets to value. Applications the. Of and. Of. Of. Of

Insecticide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Trade Name
Group 6	**Glutamate-gated chloride ion channel (GluCl) allosteric activators**	
Spinosyns	spinetoram	Delegate
Group 9	**Chordotonal organ TRPV channel modulators**	
Pyridine azomethines	pymetrozine	Fulfill 50 WG
Group 9B	**Unknown or non-specific mode of action (Pentagenic)**	
	aluminum phosphide	Phostoxin
Group 9D	**Unknown or non-specific mode of action (selective feeding blockers)**	
	flonicamid	Beleaf
Group 23	**Lipid biosynthesis inhibitor**	
Tetronic acid	spirotetramat	Movento
	spiromesifen	Oberon
Group 28	**Acts on the ryanodine receptor of the insect muscle cell, leading to muscle paralysis**	
Diamide	chlorantraniliprole	Coragen
	cyantraniliprole	Minecto Duo 40WG (premix)

[1] These products are listed Trademarks and may also contain a fungicide. Information on fungicide mode of action can be found in the Plant Treatment section.

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Actara

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Actara 240 SC (PCP# 29468)	Syngenta	Thiamethoxam 240 g/L	Soluble concentrate	2.08 L
Actara 25 WG (PCP# 29468)		Thiamethoxam 25%	Water dispersible granules	850 g

Crops, Insects Controlled and Rates

Product	Crop	Insects controlled	Application method/rate	Specific comments
Actara 240SC	Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Soil application: 3.8 - 4.8 mL/100 m row. For 90 cm row spacing, apply 131 - 156 mL/acre	Apply as an in-furrow spray at planting. Use the higher rate for extended residual control. Apply in sufficient water to ensure good coverage.
	Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Foliar application: 88 mL/acre	Apply before pests reach damaging levels. Scout fields and treat again 7 - 10 days later if populations rebuild to potentially damaging levels. Potato leafhopper: Control may require the use of two applications made at a 7 - 10 day interval.
Actara 25WG	Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Foliar application: 40 g/acre	Apply before pests reach damaging levels. Scout fields and treat again 7 - 10 days later if populations rebuild to potentially damaging levels. Potato leafhopper: Control may require the use of two applications made at a 7 - 10 day interval.

Registered Tank Mixes

Pest	Product/rate	Specific comments
Colorado potato beetle, potato leafhopper, aphids (including green peach, potato, buckthorn and foxglove aphid), Alternaria stem and stolon canker, black scurf and suppression of pink rot	Actara 240 SC at 3.8 - 4.8 L/100 m row + Quadris Flowable at 4 - 8 mL/100 m row + Bravo Ultrex 400 at 4 mL/100 m row	Use the higher rate for extended residual control of insects. Use the higher rate of Quadris Flowable when risk of disease is high.

Application Information

Actara 240 SC – Soil application
How to Apply: Ground application only. Do not apply by air. Water Volume: Ground: 40 L/acre minimum.

Actara 25 WG
How to Apply: Ground and aerial application. Water Volume: Ground: 40 L/acre minimum. Aerial: 8 L/acre minimum.

Application Tips

Actara 25 WG: Do not exceed a total of 80 g of Actara per acre during each growing season. Allow at least 7 days between applications. Avoid making aerial applications under conditions where uniform coverage cannot be obtained or where excessive spray drift may occur. Avoid spray overlap. Do not apply Actara after pre-bloom (early pink growth stage) or before post-bloom (petal fall growth stage).

Potato Seed Piece Treatment: Choose the appropriate rate for Actara 240 SC from the chart on the label, based upon the seeding rate. Use high rate for extended residual control. Do not apply more than 24.4 mL product/100 kg seed

Actara (cont'd)

process or 79.7 mL product per acre. Apply only in areas with adequate ventilation or in areas equipped to remove spray mist or dust. Apply Actara 240SC as a water-based slurry utilizing standard slurry seed treatment equipment which provides uniform seed coverage.

How it Works

Actara is a systemic neonicotinoid insecticide. It controls the sucking and chewing insects through contact and ingestion.

Restrictions

Rainfall: Avoid application of Actara when heavy rain is forecast. **Pre-harvest intervals**: 7 days. **Re-entry**: Do not enter into treated areas for 12 hours after foliar application. **Re-cropping**: Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on this label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. However, the cover crop may not be grazed or harvested for food or feed. For all other crops, a 120-day plant-back interval must be observed.

Environmental Precautions

Actara is highly toxic to certain aquatic organisms. Do not contaminate water with the product or its container. Observe buffer zones specified on the Actara label. **Runoff**: Do not apply Actara directly to freshwater habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Leaching**: Thiamethoxam is moderate to very persistent in soil and is highly mobile. The use of Actara may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or where the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) >5,000 mg/kg. Dermal LD_{50} (rabbits) = >2,000 mg/kg. Toxic to bees.

Storage

Store in cool, dry place and prevent cross contamination with other pesticides, fertilizers, food and feed.

Admire 240 Flowable /Alias 240 SC/ Grapple/Grapple$_2$

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Admire 240 (PCP# 24094)	Bayer CropScience	Imidacloprid: 240 g/L	Flowable	1 L, 3.785 L
Admire 240 SPT (PCP# 27782)	Bayer CropScience		Flowable	1 L, 3.785 L
Alias 240 SC (PCP# 28478)	ADAMA Canada		Suspension concentrate	1 L, 3.785 L
Grapple (PCP# 28726) Grapple$_2$ (PCP# 29648)	FMC of Canada		Suspension concentrate	1 L, 3.785 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Application Rate	Specific comments
Soil application			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid), potato leafhopper, potato flea beetle	7.5 - 12 mL/ 100 m row or 345 - 525 mL/acre (based on 90 cm row spacing)	The higher rate is recommended when extended length of control is needed. Do not apply more than once per season as a soil application. Do not follow a soil application with a foliar application.

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Crop	Insects controlled	Application Rate	Specific comments
Foliar application			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid)	81.0 mL/acre	For optimal control, good coverage of the foliage is needed. A maximum of two foliar applications may be made per crop per season. Aphid control: Two applications at least 7 days apart may be required to achieve control.
Potato seed piece treatment			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid), potato leafhopper, potato flea beetle	26 - 39 mL per 100 kg seed pieces	Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist or dust. Do not apply any subsequent application of imidacloprid or other Group 4 insecticide following a Group 4 potato seed piece treatment.

Registered Tank Mixes

Admire 240 can be tank mixed with Ridomil Gold 480 for suppression of Pink Rot (*Phytophthora erythroseptica*). Please refer to Ridomil Gold 240 label for use instructions and precautions.

Application Information

How to Apply: Ground application only. Do not apply by air.

Water Volume: Water volume should be adequate to provide sufficient coverage.

Application Tips

Soil application: Apply Admire 240/Alias 240 SC/Grapple as a narrow band in-furrow. For best results, direct spray on the seed pieces or seed potatoes in the furrow. **Foliar Application**: Apply product as pest numbers begin to increase but before a damaging population becomes established. Scout fields and repeat if needed. Do not make a foliar application of imidacloprid following a soil or seed piece treatment application of product in the same crop. **Potato Seed Piece Treatment**: Do not dilute with any more than 3 parts water to 1 part insecticide. Agitate or stir spray solution as needed. The higher rate is recommended when extended length of control is needed. Do not apply more than 0.47 L/acre per year. Check the label to select an effective treatment rate based upon seeding rate and desired duration of control.

How it Works

Imidacloprid is a systemic chloronicotinyl insecticide.

Restrictions

Rainfall: Do not apply product or plant treated seed pieces when heavy rainfall is forecast for the next 48 hours. **Grazing**: Do not use treated seed pieces for food, feed or fodder. **Re-entry** Interval: Do not enter treated areas for 24 hours after foliar application. **Pre-harvest interval:** 7 days after a foliar application. **Re-cropping**: Plant-back interval for cereal grains (wheat, barley, oats) - minimum of 30 days; peas and beans - minimum of 9 months. Other food and feed crops - 12 months. Green manure and other cover crops not intended for human or animal consumption can be grown without plant-back interval. Do not graze or harvest cover crops for food or feed.

Environmental Precautions

Imidacloprid is toxic to aquatic invertebrates and birds. Keep out of lakes, streams, ponds or other aquatic systems.

Runoff: Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. **Leaching**: Imidacloprid demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of Admire 240/Alias 240 SC/Grapple/Grapple$_2$ in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Toxicity

Oral LD_{50} (rats) = 4,143 - 4,870 mg/kg. Dermal LD_{50} (rabbits) = 2,000 mg/kg. Toxic to bees.

Storage

Store in cool, dry place and avoid cross contamination with other pesticides, fertilizers, food and feed.

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Agri-Mek SC

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Agri-Mek SC (PCP# 31607)	Syngenta	Abamectin: 84 g/L	Emulsifiable concentrate	2 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Potato psyllid, spider mite	91 mL	Do not make more than 2 applications per year. Allow 7 days between applications.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. Do not apply by air. Water volume: 75 L/ac.

Application Tips

Apply when pests first appear.

How It Works

Abamectin attacks the nervous system, causing paralysis within a few hours. Affected insect stops eating and dies after a few days.

Restrictions

Pre-harvest interval: 14 days. **Grazing**: Do not graze treated crop.

Environmental Precautions

Toxic to aquatic organisms, fish and wildlife. Do not apply this product directly to freshwater habitats, estuaries or marine habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = 300 mg/kg. Dermal LD_{50} (rabbit) = > 1,800 mg/kg. Toxic to bees.

Storage

Heated storage not required. Store in cool, dry place.

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Assail 70 WP

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assail 70 WP (PCP# 27128)	Nippon Soda Company Ltd.	Acetamiprid: 70%	Wettable powder	0.34 - 1.2 kg

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	22 - 34 grams	Begin applications when treatment thresholds have been reached. Use the higher application rates when (1) heavy pest pressure occurs (2) the majority of the Colorado potato beetle population is present as adults. Do not make more than 2 applications per year. Do not apply more than once every 7 days.
	Colorado potato beetle	16 - 32 grams	

Application Information

How to Apply: Ground application only. Do not apply by air. **Water Volume**: 80 L/acre minimum.

Application Tips

Thorough coverage is required to obtain optimal control. Do not exceed 69 grams product per acre per season.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Re-entry**: Do not enter treated fields for 12 hours.
Pre-harvest interval: 7 days.

Environmental Precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones as specified on the label.

Toxicity

Oral LD_{50} (rats) = 1,064 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg. Toxic to bees.

Storage

Store unused product in a cool, dry and well ventilated area.

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Beleaf

Group 9C

Formulation

Product	Company	Active ingredient	Formulation	Container size
Beleaf (PCP# 29796)	ISK Biosciences Corporation; distributed by FMC Canada	Flonicamid: 50%	Water soluble granule	1 - 100 kg

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	49 - 64 g	Use higher rates under extreme pest populations and/or dense plant foliage.
Alfalfa (seed production)	Aphids	49 - 64 g	Apply before populations reach economic thresholds or as populations begin to increase, but before damaging populations become established. Do not use seed or treated forage for human or animal consumption.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. Do not apply by air. **Water Volume**: Ground: 38 L/acre minimum.

Application Tips

Allow a minimum of 7 days between applications. Do not make more than 3 applications per year. Do not apply more than 64 grams per acre of Beleaf per application. Do not apply more than 192 grams per acre of Beleaf per season.

How it Works

Flonicamid insecticide is a member of the pyridinecarboxamide class of chemistry and controls target pests by contact and ingestion.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Pre-harvest Intervals**: Potato: 7 days. **Re-entry**: Do not enter treated areas for 12 hours after application. **Re-cropping**: There are no plant-back restrictions for crops listed on the label. All other crops may be planted 30 days after the last application.

Environmental Precautions

Flonicamid is toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

Toxicity

Oral LD_{50} (rats) > 2,000 mg/kg. Dermal LD_{50} (rats) > 2,000 mg/kg. Toxic to certain beneficial insects.

Storage

Keep containers in a dry, cool and well-ventilated place. Store in original container only.

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Closer SC

Group 4C

Formulation

Product	Company	Active ingredient	Formulation	Container size
Closer SC (PCP# 30826)	Dow AgroSciences Canada	Sulfoxaflor: 240 g/L	Suspension concentrate	1 L

Crops, Insects Controlled and Rates

Crop*	Insects controlled	Rate per acre	Specific comments
Potato	Aphid	20 - 60 mL	Do not make more than 2 applications per growing season. Do not apply more than 120 mL per acre during the growing season. Minimum of 7 days between applications.
Sugar beet			

* If Closer is used on a commodity that may be exported, information on acceptable US residue levels can be found on DowAgro Canada's web site at www.croplife.ca

Application Information

How to Apply: *Ground and aerial application.* **Water Volume**: *Ground:* 40 L/acre; *Aerial:* 12 L/acre.

Application Tips

Use proper application techniques to help ensure thorough spray coverage and correct dosage for optimum insect control. Do not apply during periods of dead calm. Avoid application of this product when winds are gusty.

How it Works

Closer interacts with certain receptors in the insect's central nervous system. Target insects cease feeding within a few minutes of application.

Restrictions

Grazing: No restrictions. **Pre-harvest interval:** Do not apply within 7 days of harvest. **Plant-back interval:** 30 day interval between the treatment of primary crops and the planting of secondary crops not on the label.
Re-entry: Do not enter or allow entry into treated areas for 12 hours.

Environmental Precautions

Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland. Apply early in the morning or late in the evening when bees are not active.

Runoff: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. Keep from freezing. Store this product away from food or feed.

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Clutch

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Clutch (PCP# 35355)	Valent Canada Inc. distributed by Nutrien Agriculture	Clothianidin 50%	Water dispersible granules	600 g

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potatoes	Colorado potato beetle	2.38 - 4.0 g/100 m row based on 80 cm row spacing	In-furrow application. Do not make more than one application per season. Do not follow a soil application with a foliar application of a Group 4 or 4A insecticide.
	Aphids, Colorado potato beetle, wireworms	28 - 42 g/acre	Foliar application. A maximum of 2 applications may be made per season. Do not make a foliar application of a Group 4 and 4A insecticide following a soil application of Clutch.

Application Information

How to Apply: In-furrow application: Ground application only. **Foliar application:** Ground and aerial applications.
Water Volume: Ground: Sufficient water volume to ensure thorough coverage. Aerial: 18 - 39 litres/acre.

Application Tips

For in-furrow and foliar applications, ensure thorough coverage by using sufficient water volume.

How it Works

Clothianidin is a systemic chloronicotinyl insecticide. It protects the seed and developing plant from insect damage.

Restrictions

This product is toxic to aquatic invertebrates, birds and small wild mammals. Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds.

Toxicity

Oral LD_{50} (rats) = technical > 5,000. Toxic to bees.

Storage

Store in a cool, dry and well-ventilated area. Do not store or transport near food or feed.

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Concept

Group 5 A

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Concept (PVP# 49611)	Aqua Graphicance	imidacloprid 75 g/L fipronil 75 g/L	Suspension	5 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle, aphids, leafhopper, potato flea beetle, tarnished plant bug, European corn borer (suppression)	400 mL	Apply only the target population has reached economic threshold. Repeat if pest population lands return to damaging levels. Minimum of 5 days between applications. Do not apply more than 2 applications per year.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. Do not apply by air. **Water Volume:** Ground: 40 L/acre minimum.

How it Works

Imidacloprid is a systemic chloronicotinyl insecticide, and fipronil is a non-systemic phenylpyrazole that works by contact and ingestion.

Application Tips

Thorough coverage of all plant parts is required for optimum performance.

Restrictions

Pre-Harvest Intervals: Potato: 7 days. **Re-entry:** Do not enter treated area for 24 hours after application.

Environmental Precautions

Highly toxic to fish and other aquatic organisms. Do not allow spray drift to come into contact with aquatic areas. Do not apply where runoff is likely to occur.

Toxicity

Oral LD_{50} (rats) = 1,144 mg/kg. Dermal LD_{50} (rabbits) = > 4,744 mg/kg. Toxic to honey bees directly exposed to Concept during application or Concept residues present on blooming crops or weeds.

Storage

Do not store on or around the bees. If stored for 1 year or longer, shake well before using. Do not store product below 4°C.

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Coragen

[redacted]

Formulations

Product	Formulation	Active ingredient	Concentration	Container size
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per Unit	Specific Comments
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Decis 5 EC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Decis 5 EC (PCPA 13708)	Bayer CropScience	Deltamethrin 50 g/L	Emulsifiable concentrate	2 mL, 5 mL

Crops, Insects Controlled and Rates

Crops	Insects controlled	Rate per acre	Specific comments
Decis 5 EC			
Alfalfa (seed production only)	Alfalfa weevil, lygus bugs	80 - 160 mL	Use the higher rate when the alfalfa weevil is present. Apply in 40 - 120 L/acre water. Do not make more than 1 application per year.
Corn (field)	European corn borer	150 - 120 mL	Apply when egg masses begin to hatch, but no later than when the first pinhole feeding is seen on the leaves. Apply in minimum of 57 L/acre of water. Do not apply more than 2 times per year.
Canola	Colorado potato beetle, leafhopper, potato flea beetle, tarnished plant bug	40 - 80 mL	Apply when insects are present or signs of insect feeding are evident. Repeat as necessary to a maximum of 2 applications per year as a ground application. Maximum of 2 applications if applied by air. Use the higher rate under severe infestations.
Canola, rapeseed, mustard	Bertha armyworm, flea beetle, diamondback moth (larvae), grasshopper, lygus bugs	80 mL	Application should be made when the insects are actively feeding. Under heavy infestations, use the higher rates.
	Lygus bugs	80 mL	Apply once per season when lygus bugs are seen feeding on the buds, flowers and developing pods.
	Cabbage seedpod weevil	80 mL	Apply once per season when adults are seen on flowerbuds or developing pods.
Wheat, barley, oats, flax, canola	Cutworm, clover cutworm (flax only), bertha armyworm (flax only)	80 mL	Apply once per season when larvae are present and feeding. Do not disturb soil after application.
	Grasshoppers	40 mL	Apply when the grasshoppers are in the 2 - 4 nymphal stage.
Sugar beets	Cutworm	80 mL	Apply once per season when larvae are present and feeding. Do not disturb soil after application.
Sunflower	Sunflower beetles	40 mL	Apply when sunflower is at the colyledon to 2 leaf stage. Apply once per season.
Rangeland, pasture and roadsides	Grasshoppers	40 mL	Apply when the grasshoppers are in the 2 - 4 nymphal stage. The higher rate should be used when the proportion of mature and late nymphal stages in the population are high. Do not apply more than 3 times per year.

Application Information

How to Apply: Ground and aerial application with the exception of alfalfa and corn, which require ground application only. **Water Volume:** Ground: Alfalfa - 40 - 120 L/acre; Field corn - 100 L/acre minimum; Forages - 40 - 200 L/acre; Canola, mustard - 40 L/acre; Canola - 40 - 80 L/acre; Sugar beets - 40 L/acre. **Aerial:** 4.6 - 9.9 L/acre.

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Application Tips

Best control is achieved by morning or evening applications. Do not spray under a strong temperature inversion or when temperature exceeds 25°C. With severe flea beetle and grasshopper infestations, spray fence rows and a 15 metre strip into adjacent fields.

How It Works

Deltamethrin is a non-systemic, synthetic pyrethroid that works by contact and ingestion. Speed of kill depends on target insect and environmental conditions. Death can occur within 2 hours.

Restrictions

Rainfall: Do not apply within 1 hour of rain. **Grazing:** Beef and dairy cattle may graze treated fields immediately after application. **Pre-harvest Intervals (Days):** alfalfa (20), barley (40), canola (7), flax (40), lentils (30), mustard (7), oats (21), potatoes (3), sunflower (70), wheat (40), sugar beets (100).

Environmental Precautions

Decis is toxic to fish and aquatic organisms. Overspray or drift into aquatic areas must be avoided. Do not apply where streams, lakes, ponds or water used by livestock or for domestic purposes may be contaminated. Maintain a minimum 30-metre buffer for ground application and a minimum 100-metre buffer for aerial application. Applications should not be made when wind or rain could favour drift or runoff into lakes and ponds.

Toxicity

Oral LD_{50} (rats) Decis = 395 mg/kg. Toxic to bees and other beneficial insects. Do not apply when bees are foraging.

Storage

Do not store below freezing. Do not store near feed or food. Keep away from heat, sparks and open flames.

Delegate

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Delegate (PCP# 28378)	Dow AgroSciences Canada	Spinetoram: 25%	Wettable granules	840 g

Crops, Insects Controlled and Rates

Crops	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle	65 - 97 g	Time application for egg hatch or small larvae. Maximum 2 applications per year with a minimum retreatment interval of 7 days.
	European corn borer	65 g	Time application to coincide with peak egg hatch. Maximum 3 applications per year with a minimum retreatment interval of 7 days.
Wheat, barley, oats, rye	Armyworm	40 - 81 g	Apply when economic thresholds dictate. Maximum 3 applications per year with a minimum retreatment interval of 5 days.

Application Information

How to Apply: Ground application only. Do not apply by air

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Delegate (cont'd)

Application Tips
Apply in sufficient water volume to cover the entire plant using a combination of nozzles and pressure designed to deliver thorough, even coverage. Do not apply through irrigation systems.

How it Works
Spinetoram affects the insect nervous system. It works through ingestion or contact with the target insects. Target insects cease feeding within a few minutes, although death may take a few days.

Restrictions
Pre-harvest Intervals (days): Wheat, barley, oats, rye: (21); Potato (7). **Re-entry**: Do not enter treated field for 12 hours. **Grazing**: No restrictions.

Environmental Precautions
Delegate is toxic to bees, small mammals, aquatic organisms, non-target terrestrial plants, and may be toxic to certain beneficial insects exposed to direct treatment, drift, or residues on flowering crops or weeds. Do not apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees, and other beneficial insects or small mammals in habitats next to the application site, such as hedgerows and woodlands. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg. Toxic to bees.

Storage
Store in a cool, dry place. Keep from freezing.

Dibrom Insecticide

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Dibrom Insecticide (PCP# 7442)	Loveland Products Canada	Naled: 900 g/L	Emulsifiable concentrate	1 - 10 L

Crops, Insects Controlled and Rates

Crops	Insects controlled	Rate per acre	Specific comments
Alfalfa, clover, vetch	Aphids, leafhoppers, lygus bug	425 - 850 mL	Ground and aerial application. When using the maximum rate of 850 mL/acre must limit the area treated to 200 ha (494 acres) per day.
Beans (dry or field) peas (processing)	Alfalfa looper, aphids, red spider mites	425 - 850 mL	Ground and aerial application. Workers using the maximum rate of 850 mL/acre must limit the area treated to 200 ha per day.
Potato	Colorado potato beetle, leafhoppers, flea beetles	425 mL	Ground and aerial applications.
Sugar beet	Red spider mites, leafhoppers	850 mL	Ground application only. Do not apply to food or forage crops within 5 days of harvest or grazing.
Rangeland, field areas and pastures	Grasshoppers – nymphs	215 - 332 mL	Ground and aerial application. Animals may be present during treatment. If animals must be handled within 48 hours of application, wear chemical resistant gloves.
	Grasshopper – adults	271 - 389 mL	

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Application Information

How to Apply: Ground and aerial application with the exception of sugar beets, which require ground application only. **Water Volume**: Ground: 40 - 120 L/acre. Aerial: 4 - 12 L/acre.

Application Tips

Thorough coverage required. Do not apply when temperature is over 32°C.

How it Works

Naled is a contact insecticide.

Restrictions

Grazing: Do not apply to food or forage crops within 4 days of harvest or grazing, unless otherwise specified.
Re-entry: Do not allow worker entry into treated areas (outdoor or indoor) for 48 hours following application. If animals must be handled within 48 hours of application, wear chemical resistant gloves.

Environmental Precautions

This product is toxic to fish, birds and other wildlife. Keep out of any body of water. Do not contaminate water when cleaning equipment or disposing of wastes.

Toxicity

Oral LD_{50} (female rats) > 235 mg/kg (technical). Dermal LD_{50} (rabbits) > 5,050 mg/kg (technical).
Toxic to bees. Avoid application during periods of bee activity.

Storage

Do not use or store near heat or open flame. Store in a cool, dry place.

Eco Bran

Group 1A

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Eco Bran (PCP# 25185)	Peacock Industries	Carbaryl: 2%	Granules 2%	20 kg

Crops, Insect Controlled and Rates

Crops	Insects controlled	Rate	Specific comments
Wheat, oats, rye	Grasshopper	20 - 40 g/100 m^2	Apply when pest emergence is at its peak and populations are above the economic threshold. The higher rate should be used for older grasshoppers or severe infestations.
Barley			
Corn (field and sweet)			
Canola			
Beans			
Alfalfa, clover			
Field borders, headlands, rights-of-way, roadsides, wastelands			

Application Information

How to Apply: Ground application only. Do not apply by air. Broadcast applications may be made with spreaders, hand applicators or by hand.

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Eco Bran (cont'd)

Application Tips
Timing is essential for effective control.

How it Works
A carbamate insecticide that works by ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions.

Restrictions
Rainfall: Do not apply just before rain. **Grazing**: May be used in pastures while beef cattle are grazing. **Pre-harvest Intervals (Days)**: Barley (28); canola (treat only seedlings), beans (5), oats, rye, wheat (14), field corn, sweet (1), alfalfa, clovers (2), forage crops (2), field borders, headlands, rights-of-way; roadsides, wasteland (0). **Livestock Re-entry Period to Pasture or Rangeland (Days)**: Beef cattle or other livestock (1), dairy cattle (2).

Environmental Precautions
Do not allow product to contaminate feed troughs or drinking water. Do not apply within 50 metres of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3 - 8 km/h and do not favor drift.

Toxicity
Oral LD_{50} (rats) = 540 mg/kg.

Storage
Store apart from food and feeds.

Imidan 70 WP Instapak

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Imidan 70 WP Instapak (PCP# 29064)	Gowan Company	Phosmet: 70 %	Wettable powder	2.265 kg (5 x 0.453 kg)

Crops, Insect Controlled and Rates

Crops	Insects controlled	Rate per acre	Specific comments
Alfalfa	Alfalfa weevil, alfalfa blotch leafminer	648 g	Do not apply during bloom. Do not apply more than once per cutting or within 7 days of harvest. Do not make more than 3 applications per season.
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid	648 g	Do not apply within 7 days of harvest. Maximum of 5 applications per season.

Application Information
How to Apply: Ground application only. Do not apply by air. **Water Volume**: Apply in sufficient water to provide good coverage.

Application Tips
Imidan is packaged in water-soluble sachets that are to be dropped into the spray tank unopened. Do not use in low-volume, gear-type spray equipment. Do not apply during periods of dead calm or when winds are gusty.

How it Works
Phosmet is a non-systemic, contact, organophosphorous insecticide.

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Restrictions
Re-entry: 5 days.

Environmental Precautions
Imidan is toxic to birds, small wild mammals and aquatic organisms. Do not apply within 15 metres of sloughs, ponds, streams, dugouts or open water. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity
Oral LD_{50} (rats) = 285 mg/kg. Toxic to bees.

Storage
Store above 0°C. Keep water soluble sachets in their protective container and store in a cool, dry place.

Lannate

Group 1A

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lannate (PCP# 10868)	E.I. duPont Canada	Methomyl	Soluble powder	225 g

Crops, Insects Controlled and Rates

Crops	Insects controlled	Rate per acre	Specific comments
Canola	Alfalfa looper, Bertha armyworm, beet webworm, clover cutworm, cabbage looper	87 - 207 g	Aerial and ground applications.
Flax	Bertha armyworm	89 - 109 g	Aerial and ground applications.
Peas	Alfalfa looper, pea aphids	200 g	Ground applications only.
Potato	Leafhoppers, flea beetles, aphids	215 g	Ground applications only.
	Variegated cutworm	109 - 218 g	
Beans (snap)	European corn borer	223 g	Ground applications only.
Corn (sweet)	Aphids, corn earworm	175 - 250 g	Ground applications. Corn earworm: Apply 3 sprays at 2-4 day intervals, beginning when 25% of the ears show silk. European corn borer: Apply at 5-day intervals when egg masses begin to hatch, but no later than when the first feeding damage is seen on leaves.
	European corn borer	253 g	
Wheat, oats, barley	Common armyworms	109 - 218 g	Air and ground applications.
	Thrips	121 g	

Application Information
How to Apply: Ground and aerial application. See above table for details. **Water Volume**: Ground: 40 - 140 L/acre. Aerial: 9 L/acre minimum.

Application Tips
Apply when insects are causing economic damage; continue applications at 5 - 7 days intervals or as needed. Apply the low rates on small plants, small insects and light insect infestations. Use 1 to 3 applications of the highest recommended rate for controlling severe infestations. Early morning or late evening applications times are recommended.

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Lannate (cont'd)

How it Works
A carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short-term residual.

Restrictions
Pre-harvest Intervals (days): barley, oats, wheat (20); canola, flax (8); peas (1); potatoes, sweet corn (3); snap beans (7).

Environmental Precautions
This product is toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where runoff is likely to occur. Do not apply when weather conditions favour drift from areas treated.

Toxicity
Oral LD_{50} (rats) = technical 17 - 24 mg/kg. Toxic to bees.

Storage
Store product in original container only. Store away from other pesticides, fertilizer, food or feed. Do not allow product to freeze.

Lorsban NT/Pyrinex/Nufos/Citadel/ Warhawk 480 EC/MPower Krypton

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lorsban NT (PCP# 29660)	Dow AgroSciences	Chlorpyrifos: 452 g/L	Emulsifiable concentrate	10 L, 208 L
Nufos 4 E (PCP# 25831)	FMC of Canada	Chlorpyrifos: 480 g/L		10 L, 115 L, 208 L
Pyrinex 480 EC (PCP# 23705)	ADAMA Canada			10 L, 208 L
Citadel 480 EC (PCP# 27479)	IPCO			10 L
Warhawk 480 EC (PCP# 29984)	Loveland Products Canada			1 - 500 L
MPower Krypton (PCP# 30985)	NewAgco Inc.			10 L, 115 L

Crops, Insects Controlled and Rates

Crops	Stage	Insects controlled	Rate per acre
Barley, oats, wheat	Soil or foliage	Armyworm (including Bertha armyworm), army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm	355 - 485 mL
		Brown wheat mite	250 mL
		Grasshoppers – nymphs	235 mL*
		Grasshoppers – adults	355 mL
		Russian wheat aphids	202 mL
Wheat	Foliage	Orange blossom wheat midge	335 - 405 mL
Canola	Soil or foliage	Army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm, variegated cutworm	355 - 485 mL

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Crops	Stage	Insects controlled	Rate per acre
Canola	Foliage	Alfalfa looper, armyworm, Bertha armyworm	305 - 405 mL
		Diamondback moth (larvae)	405 - 607 mL
		Lygus bugs	202 - 405 mL
		Grasshoppers	235 - 355 mL
Field corn, sweet corn	Seedling; 2- 5 leaf	Black cutworm, dark-sided cutworm, red-back cutworm	405 - 570 mL
	Soil: Pre-plant	Black cutworm, dark-sided cutworm, red-back cutworm	570 mL
Flax	Soil or foliage	Army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm, variegated cutworm, armyworm	355 - 405 mL
		Bertha armyworm	305 - 405 mL
Sunflower	Soil or foliage	Army cutworm, pale western cutworm, redbacked cutworm	405 mL
Lentils	Soil or foliage	Pale western cutworm	354 - 405 mL
		Grasshoppers	234 - 405 mL
Potato	Soil or foliage	Colorado potato beetle (larvae), potato flea beetle , tarnished plant bug	454 mL
		Black cutworm, darksided cutworm, redback cutworm	Soil: 570 mL Seedling: 405 - 570 mL
Sugar beet	Soil or seedling	Pale western cutworm, redbacked cutworm	405 - 570 mL

*Not registered for Warhawk 480 EC.

Registered Tank Mixes

Citadel, Lorsban NT and Pyrinex may be tank mixed with 2,4-D amine and ester. Avenge, Banvel II + 2,4-D amine, Buctril M, MCPA amine and ester. Warhawk, Nufos and MPower Krypton may be tank mixed with Avenge, Banvel II, 2,4D amine and ester, MCPA amine and ester, Buctril M. Logic M can be tank mixed only with Citadel.

Caution: When tank mixing, always add the herbicide to the spray tank first and then add the chlorpyrifos insecticide.

Application Information

How to Apply: *Ground and aerial application* (unless otherwise specified on the label).
Water Volume: *Ground*: 20 - 80 L/acre. *Aerial*: 4 - 15 L/acre minimum.

Application Tips

Uniform coverage of crop is essential: use a boom configuration that provides optimum coverage. Use higher rates when infestations are heavy and when foliage is dense.

Bertha armyworm, and armyworm: Use higher rate for large larvae and when canopy is dense.

Cutworms: Higher rates and water volumes when the top 1 cm of soil surface is extremely dry or when the infestation is heavy.

Foliage treatments: When spraying crops near maturity, an application system that gives maximum penetration of the crop canopy is necessary to get good insect kill. Do not apply to crops in bloom. Best results will be obtained when application is made during early evening. Avoid application under hot temperatures. Do not apply to plants under extreme drought stress.

How it Works

Chlorpyrifos is a broad-spectrum, nonsystemic and contact organophosphate insecticide and acaricide.

Expected Results

Insects must come in direct contact with the insecticide to be affected. Degrades on foliage by weathering, and a significant kill of insects eating treated foliage may not last beyond 48 hours after treatment. Somewhat more persistent in soil, control of soil-dwelling insects may be more durable.

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Restrictions

Rainfall: Foliar treatments should be made 4 – 6 hours before forecast rainfall. Soil treatments should not be applied if heavy rainfall is forecast. **Grazing:** Cereals grown for cover crop treated with chlorpyrifos insecticide should not be harvested for human or animal consumption if treated within 60 days of harvest. **Pre-harvest Intervals (Days):** Barley, oats, wheat (60); canola (21); corn – field and sweet only (70); flax (21); lentils (21 days for applications up to 194 mL/acre); 100 days for applications greater than 194 mL/acre); potatoes (7); sugar beets (90); sunflowers (42). **Re-entry:** Do not enter treated field for at least 24 hours after application. **Re-cropping:** No information is specified on the label. **Maximum Allowable Applications:** Barley, oats, wheat, canola, corn, flax, lentil, sunflower, potatoes – do not apply more than once per season. See label for restrictions on other crops.

Environmental Precautions

Chlorpyrifos is toxic to birds and wildlife and extremely toxic to fish and aquatic organisms. Do not apply directly to water. Drift and runoff from treated areas may be hazardous to aquatic organisms in adjacent aquatic sites. **Runoff:** To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. **Leaching:** Binds to organic matter in soil. As a result it is less likely to leach in soils with adequate organic matter levels.

Toxicity

Oral LD_{50} (rats) formulations = 440 – 900 mg/kg. Toxic to bees.

Storage

Keep away from heat, sparks and open flame. Do not store above 30°C for extended periods of time. Keep away from food, drinks and animal feed.

Mako

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Mako (PCP# 30218)	Nufarm Agro	Cypermethrin 487 g/L	Emulsifiable concentrate	1 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Wheat, barley, canola, lentil/chick, mustards, camelina	Grasshoppers	20 - 28 mL	Apply during early stage of insect development - up to the fourth instar (approximately 15 mm and before wing development). Use the higher rate for older insects or severe infestations. Ground application only.
Corn	European corn borer, corn earworm	71 mL	For control of corn borer, apply when egg masses begin to hatch but no later than when first feeding is seen on foliage. For second brood borers in late planting, apply before tassels show. For control of corn earworm, spray directly to ensure good coverage of ears and silks.
Canola	Bertha armyworm	Ground: 28 mL Air: 35 mL	Apply when insects or signs of insect feeding first appear. Repeat treatment as necessary.
	Flea beetle	28 mL	Apply when insects or signs of insect feeding first appear. Repeat treatment as necessary. Ground application only.
Sunflower	Sunflower beetle, sunflower seed weevil	28 mL	Apply when insects or signs of insect feeding first appear. A second treatment may be required after 5 days.
Potato	Colorado potato beetle, flea beetles, leafhoppers	Ground: 28 - 50 mL Air: 50 mL	Apply when insects or signs of insect feeding are present. Use the high rate for severe infestations.

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Crop	Insects controlled	Rate per acre	Specific comments
Insects, attack, barley	• Cutworms • Variegated cutworm • Wheat midge - prairies only	1 L/ac	• Make soil only control cutworms spread only on cutworms that surface to feed. Ground application only.

Application Information

How to Apply Ground and aerial application. **Water Volume** Ground: Corn, potatoes: 100 – 200 L/acre. Canola: 50 – 200 L/acre. Other crops: Minimum of 10 L/acre. Aerial: Canola (fleabby area events, corn (European corn borer), potatoes (Colorado potato beetle, flea beetles, leafhoppers and tarnished plant bugs, sunflowers (sunflower beetle): 4.7 – 9.4 L/acre.

Application Tips

Ensure uniform application. For grasshopper control, avoid spraying when air temperatures are above 29°C. For cutworm control, spray under warm, moist conditions, and do not disturb the soil surface for at least 7 days.

Group 1A Insecticides

Malathion is a synthetic pyrethroid insecticide. It works by contact and stomach action.

Restrictions

Cropping Do not graze dry treated crops or cut for hay. there are not sufficient data to support such use.
Pre-harvest Interval (days): Wheat (3%), barley (14%), canola (14%), sunflowers (7%), potatoes (7), corn (7).
Maximum application per season See label for specific crop and use information.

Environmental Precautions

Malathion is highly toxic to aquatic organisms, including fish. An untreated border of 15 metres for ground applications and 300 metres for aerial applications must always be left around environmentally sensitive areas such as sloughs, streams, rivers, dugouts and wetlands.

Toxicity

Oral LD_{50} (rats) = 740 mg/kg. Toxic to bees.

Storage

Store in a locked chemical shed.

Malathion

Group 1B

Formulations

Product	Company	Active Ingredient	Formulation	Container size
[illegible]	[illegible]	Malathion 440 g/L	Emulsifiable concentrate	[illegible]
[illegible]	Loveland Products Canada	Malathion 85 %		[illegible]
[illegible]	Loveland Products Canada	Malathion 44.4%		[illegible]
[illegible]	Loveland Products Canada	Malathion 2 %	Bait	[illegible]
[illegible]	[illegible]	Malathion 2%	Bait	[illegible]

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Fungus, Insects Controlled and Rates

Crops	Insects controlled	Rate per acre		
		Formulation	Amount of active ingredient	Amount of formulation
Alfalfa	Alfalfa weevil larvae, aphids, grasshoppers, leafhoppers, lygus bugs, spittle insect, spotted alfalfa aphid	1.33 - 1.67 L	0.96 - 0.96 kg	1.33 L plus 1 spotted alfalfa aphid
	Alfalfa snout beetle	1.33 L	0.96 kg	
Flax	Grasshoppers	0.96 - 0.96 L	0.96 - 0.96 kg	
Barley, oats, rye, wheat	Armyworms, English grain aphids, grasshopper, wheat stem midge	0.33 - 0.67 L	0.96 - 0.96 kg	0.17 - 0.34 L wheat stem midge only
	Grasshoppers	0.96 L		
	Cereal leaf beetle	0.24 - 0.48 L	0.48 kg	0.12 - 0.24 L
Maize	Aphids, leafhoppers, Western bean cutworm, spittle worm	0.33 - 1.33 L	0.24 - 0.96 kg	
	Non-corn silk / tag suppression		0.24 L	
Canola (prairie, round protection)	Aphids		0.24 L	
Canola, mustard	Flea beetles, grasshoppers	0.96 - 0.96 L	0.96 - 0.96 kg	
	Diamondback moth larvae	0.48 - 0.96 L	0.12 - 0.24 L	0.12 - 0.24 L canola
Maize	Aphids, grasshoppers, leafhoppers, spittle worm		0.96 - 0.96 kg	0.24 L grasshoppers
Maize (sweet)	Aphids, corn worm	0.33 - 1.33 L	0.24 - 0.96 kg	
Oats (grain/forage)	Armyworms, European corn borers		0.96 - 0.96 kg	
Lentils	Grasshoppers	0.96 L	0.96 L	
	Non-corn silk / tag suppression		0.24 L	
Peas	Pea aphids, leafhoppers, pea weevil, spittle worm, non-corn silk / tag suppression		0.96 L	
Potatoes and sugarbeet	Grasshoppers		0.24 L sugarbeet maximum 0.1 L/ha potato	0.48 - 0.96 L
Potato	Aphids, leafhoppers, Colorado potato beetle, spittle worm	0.33 - 1.33 L	0.24 - 0.96 kg	
Sugar beet	Flea beetle		0.24 L	

Where to Apply

Foliar spray

Application: Where economic thresholds are reached. Do not apply in August in Alberta, Manitoba and Saskatchewan. Spray solution should be applied in a minimum of 100 L/ha by ground equipment or 10 L/ha by aerial equipment. Ensure adequate coverage of plant foliage. Where there are dense stands and temperatures are above 24°C, higher rates may be required to control or damage may appear.

Harvest grain management: To be used only for second cereal grain per year. To grain to bring treated or treated straw feed savings. Refuse protection - immediately after grain is treated has reached.

Storage precaution: Prior to filling of grain storage structures.

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Mixtures Chlorantraniliprole + cyhalothrin (Group 28)

How it Works

Cyhalothrin-lambda is a pheromone, synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide. It has no fumigant or systemic activity. Best results will be obtained when applied during early developmental stages of pests as determined by regular monitoring.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Grazing:** Do not graze or feed livestock treated forage or cut green crop for fed or silage. **Pre-harvest intervals:** See above table. **Re-entry:** Do not re-enter treated areas until 24 hours after treatment.

Environmental Precautions

Toxic to aquatic organisms and fish. Do not apply within 15 m of environmentally sensitive areas using ground equipment and 100 m of environmentally sensitive areas when applying by air. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (female rats) Minecto 120 EC/Silencer 120 EC > 2750 mg/kg; technical > 5g mg/kg. Toxic to bees.

Storage

Heated storage not required. Storage below 0°C will not impair the effectiveness of Minecto 120 EC or Silencer 120 EC however following such storage, uptake will be slow. Store in a cool, well ventilated area away from food or feed.

Minecto Duo 40WG

Group 6, 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Minecto Duo 40WG (PUP# 40000)	Syngenta	Thiamethoxam 20% Cyantraniliprole 20%	Wettable granule	5.0Kg

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids, Colorado potato beetle, flea beetles, potato leaf hopper	175 - 250 g	Minecto Duo is applied as an in furrow application at the seeding depth or as a narrow surface band above the seedline during planting. Prepare no more spray mixture than is needed for the immediate operation. Do not let spray mixture stand overnight in the spray tank.

Registered Tank Mixes

None registered

Application Information

How to Apply: Ground application only. Do not apply by air.

Application Tips

Apply in sufficient water volume to ensure uniform application and incorporation into the soil. Do not use a foliar application of a product containing a Group 4 (neonicotinoid) or Group 28 (diamide) insecticide following in-furrow or soil application of Minecto Duo 40WG.

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How It Works

Thiamethoxam is a neonicotinoid insecticide. Insects are controlled through contact and ingestion. Cyantraniliprole exposure results in paralysis and death.

Restrictions

Rainfall: Avoid applications of Minecto Duo 40WG when heavy rain is forecast. **Pre-harvest interval**: 7 days. **Re-entry**: Do not enter into treated areas for 12 hours after foliar application. **Re-cropping**: Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on the label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. However, the cover crop may not be grazed or harvested for feed or food. For all other crops, a 120-day plant-back interval must be observed.

Environmental Precautions

Minecto Duo is toxic to aquatic organisms. Do not apply this product directly to freshwater, estuaries or marine habitats. **Runoff**: To reduce runoff from the treated areas to aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil.

Toxicity

Oral LD_{50} (rats) >5,000 mg/kg. Dermal LD_{50} (rats) = >5,000 mg/kg. Toxic to bees.

Storage

Store in cool, dry place.

Monitor

[redacted]

Formulation

Product	Company	Active ingredient	Formulation	Container size
[redacted]	[redacted]	Methamidophos 480 g/L	Liquid	10 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Canola/rapeseed	Bertha armyworm	233 - 930 mL	Applications should begin when small larvae are present or when damage first appears. A maximum of two applications may be made per season. Do not apply within 10 days of harvest.
	Grasshopper	930 mL	Applications should begin when migration of grasshoppers from ditches and field borders becomes apparent. A maximum of two applications may be made per season.
Potato	Aphids, Colorado potato beetle, potato flea beetle, potato leafhopper	707 - 930 mL	Apply in a 10 to 14 day program or as necessary. Do not apply within 14 days of harvest.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 80 - 400 L/acre. Aerial (canola only): 4 L/acre minimum.

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Monitor (cont'd)

Application Tips
Avoid use during flowering and pollination periods.

How it Works
Methamidophos is a broad spectrum, organophosphorus insecticide and acaricide that works by contact and systemic action. Non-phytotoxic when used as directed. Contact effectiveness may persist for 7 - 21 days.

Restrictions
Re-entry: Do not re-enter treated fields until drifting insecticide and volatile residues have dissipated.

Environmental Precautions
This product is toxic to fish and wildlife. Do not apply to any body of water. Wildlife in contact with treated areas may be harmed. **Drift**: Do not apply under conditions involving possible drift to food, forage or other plantings that might be damaged.

Toxicity
Oral LD_{50} (rats) = 13 - 15 mg/kg. Toxic to bees.

Storage
Store and display apart from food or feed. Store in a cool, dry place but not below -10°C. Protect from heat.

Movento 240 SC

Group 23

Formulation

Product	Company	Active ingredient	Formulation	Container size
Movento 240 SC (PCP# 28963)	Bayer CropScience	Spirotetramat: 240 g/L	Suspension concentrate	2 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	99 - 148 mL	Apply when insect populations begin to build and before a damaging population becomes established. Maximum application per crop season: 295 mL. Minimum interval between applications: 7 days. Do not apply within 7 days of harvest.

Application Information
How to Apply: Ground application only. Do not apply by air. **Water Volume**: Ground: 120 L/acre minimum.

Application Tips
Rate selected for use depends on aphid infestation level. Apply in adequate water for uniform coverage. For high insect pressure a follow-up application may be necessary 1 - 2 weeks after initial application.

How it Works
Movento 240 SC is fully systemic, moving through phloem and xylem to all plant tissues including new shoot, leaf and root growth. Movento 240 SC is active primarily during ingestion by immature insect life stages.

Restrictions
Re-cropping: Plant-back interval: A plant-back restriction of 30 days is required for all crops not on the label.
Re-entry: Do not enter or allow worker entry into treated areas during the restricted entry interval of 12 hours.

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Environmental Precautions

This product is toxic to aquatic organisms. Do not apply to any body of water. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast. **Drift**: Movento is toxic to non-target terrestrial plants. Maintain a buffer zone of 1 metre between the point of direct application and the closest downwind edge of sensitive terrestrial habitats.

Toxicity

Oral LD_{50} (female rats) = > 2,000 mg/kg. Dermal LD_{50} (male/female combined rats) = > 4,000 mg/kg. Toxic to bees.

Storage

Do not allow product or containers to freeze. Store in a cool, dry place. Store in original container.

Oberon

Group 23

Formulation

Product	Company	Active ingredient	Formulation	Container size
Oberon (PCP# 28905)	Bayer CropScience	Spiromesifen: 240 g/L	Suspension	2 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Alfalfa (seed production only)	Two-spotted spider mite	200 - 400 mL	Do not exceed 3 applications per season with a minimum interval of 7 days between applications. Maximum allowed per crop season: 1,200 mL/acre.
Corn (field and seed)	Bank grass mite, two-spotted spider mite	160 - 240 mL	Maximum amount allowed per crop season: 480 mL/acre. Maximum number of applications per crop season: 2.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 40 L/acre minimum. Aerial: 20 L/acre minimum.

How it Works

Spiromesifen is in the Tetronic acid class of insecticides and works by contact, inhibiting lipid biosynthesis in the insect. Oberon has activity on all mite developmental stages. Immature mite stages tend to be more susceptible to Oberon than adults.

Restrictions

Pre-harvest Intervals: Forage corn – 5 days, grain corn – 30 days. Alfalfa – none listed. **Re-entry**: Do not enter or allow worker entry into treated areas during the restricted entry interval of 12 hours. **Re-cropping:** Field corn – immediate plant back. Wheat, barley and alfalfa – 30 days. All other crops – 12 months.

Environmental Precautions

To prevent potential harm to bee brood, avoid application of this product during crop flowering period or when flowering weeds are present. Do not apply this product directly to freshwater habitats estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

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Oberon (cont'd)

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) => 4,000 mg/kg.

Storage
Store in a cool, dry place. Do not store below freezing.

Orthene

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Orthene (PCP# 14225)	Arysta LifeScience	Acephate: 75%	Soluble powder	1.5 kg

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Corn (seed, sweet)	European corn borer	300 - 440 g	Apply when egg mass count indicates an economically damaging population. Use the high rate only when heavy pest infestations are present.
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug	300 - 440 g	Begin applications at first sign of insects and repeat on a 7 - 10 day schedule.

Note: If Orthene is to be used on a commodity that may be exported to the U.S. and you require information on acceptable residue levels in the U. S., visit CropLife Canada's web site at www.croplife.ca

Application Information
How to Apply: Ground application only. Do not apply by air. **Water Volume**: Ground: Corn: 90 - 400 L/acre; Potatoes: 90 - 660 L/acre.

Application Tips
Do not apply more than 4 applications per season.

How it Works
Systemic insecticide: Stomach poison.

Restrictions
Grazing: Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not feed corn fodder or forage from treated crop to livestock. **Pre-harvest Intervals**: Do not apply within 21 days of harvest. **Re-entry**: Do not re-enter treated corn fields for 5 days. Do not re-enter treated potato fields for at least 24 hours. See label for more details on entering treated fields.

Environmental Precautions
Orthene is toxic to aquatic organisms. Do not apply to any body of water. Orthene is also toxic to birds and mammals. Observe buffer zones as specified on the label. **Leaching**: Orthene has a potential to leach through soil to groundwater. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or where the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = 605 - 1,100 mg/kg. Toxic to bees.

Storage
Store in cool, dry place. Protect from excessive heat.

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Phostoxin

Group 8B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Phostoxin Tablets* (PCP# 15736)	Gardex Chemicals Ltd.	Aluminum phosphide: 55%	Fumigants	1 kg
Phostoxin Pellets** (PCP# 15735)				
Phostoxin Sache*** (PCP# 16438)				

* Tables (3 g) release 1.0 g phosphine upon decomposition. **Pellets (0.6 g) release 0.2 g phosphine upon decomposition.

*** Sachet : (34 g) release 11.0 g phosphine upon decomposition

Note: Order directly – Gardex Chemicals Ltd.: 1-800-804-3633 (British Columbia location).

Insects Controlled

Angoumois grain moth
bean weevil
cadelle
cigarette beetle
dermestids
dried fruit moth
flour beetles
granary weevils
Indian meal moth
khapra beetle
lesser grain borer
Mediterranean flour moth
rusty grain beetle
saw-toothed grain beetle

Rates

Crop	Tablets
Raw agricultural commodities, animal feeds and processed foods	4 - 6/m³
Commodity temperature °C	Exposure times (days)
Over 20	3
16 - 20	4
12 - 15	5
5 - 11	10
Below 5	Do not fumigate

Note: Suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.

Application Tips

General: Never fumigate alone. Never fumigate any structure occupied by human or animals or physically adjoining another structure occupied by human or animals. Personnel involved in fumigation must leave the structure within 2 hours of starting fumigation. Person supervising must be a licensed fumigator, and personnel assisting must be trained and appropriately licensed in the use of aluminum phosphide.

Fumigating grain storage units: Make sure the structure is tight enough to retain the fumigant. Seal the structure as necessary. During fumigation, leave all doors, vents, etc. open to create cross-ventilation in the structure. Tablets may be probed into grain or fed into the grain stream as the grain is transferred from one bin to another. Probing requires a pipe 3 cm in diameter and long enough to reach within 1.5 m of the bottom of the storage unit. Probes are made in a 1.5 m horizontal grid across the grain surface. Fumigant tablets are dropped down the pipe at 15 cm intervals as the pipe is withdrawn from the grain. The objective is to distribute the tablets as evenly as possible throughout the grain mass. To achieve the proper dosage when treating a stream, apply the tablets uniformly to the grain stream based on flow rate. After application, all openings should be sealed and entries locked and placarded. After the exposure period, open doors and windows for aeration. Remove all warning placards when aeration is complete.

How it Works

Phosphine (hydrogen phosphide) is a colourless gas with a carbide-like odour and high volatility. Formulated product consists of aluminium phosphide, ammonium bicarbonate, urea and paraffin. Upon exposure to air, the ammonium bicarbonate breaks down to form ammonia (a pungent, warning gas) and carbon dioxide (a fire suppressant). Within 1 - 4 hours, depending on temperature and humidity, the product begins to decompose and release phosphine. After decomposition, there remains a grey-white dust composed almost entirely of non-poisonous aluminum hydroxide

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Phostoxin (cont'd)

with trace amounts of undecomposed aluminum phosphide. The dust is eliminated when raw agricultural commodities are moved.

Expected results

The effectiveness of this product depends on the fumigation achieved by the release of phosphine gas. Therefore, tightness of the area to be fumigated and temperature of the commodity are essential when determining dosage rates and exposure rates. The tighter the bin and the warmer the temperature of the commodity, the lower the dosage required and vice versa.

Restrictions

Aerate finished food for 48 hours before it is offered to the consumer.

Toxicity

Hydrogen phosphide gas is very toxic to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning results from ingestion or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats and oils.

Precautions

Protective equipment

It will be necessary to wear a gas mask if the treated area is entered prior to aeration. It is not necessary to wear a gas mask when product is applied according to label directions. Wear gloves of cotton or other breathable material when handling the product. Only open containers in open air and with the opening pointing away from your face. Wash hands after use of the product.

Reduce gas hazards

Never let tablets come in direct contact with liquid – this contact causes the immediate release of hydrogen phosphide. Never open a container except for immediate usage. Never confine the product in small gas proof enclosures such as plastic bags. Such confinement could cause the gas concentration to reach the lower flammability level. Take precautions in areas where copper, brass or gold are present, as corrosion may occur. Never fumigate in areas containing electronic or telephone equipment, photographic film or copy paper. Remove such items or protect them from exposure to the gas. Hydrogen phosphide has great penetrating power, and gas may slowly seep through concrete block walls. Hydrogen phosphide does not layer, but expands to fill the available space.

Symptoms of poisoning

Severity depends on concentration of hydrogen phosphide involved. Mild poisoning results in fatigue, nausea, pressure or pain in the chest, ringing in the ears and uneasiness. Hydrogen phosphide is not a chronic poison, and these symptoms will readily disappear with rest and fresh air. Greater quantities of gas produce such symptoms as vomiting, stomach ache, diarrhea, disturbance in equilibrium and dyspnea (difficulty in breathing). Very high concentrations quickly cause bluish-purple skin colour, agitation, poor muscle co-ordination, sub-normal blood oxygen content, unconsciousness and death. Death can occur very quickly or be delayed several days as a result of pulmonary edema and collapse, by paralysis of the central respiratory system. In cases of severe poisoning, disturbance in liver and kidney function can also occur.

First aid

Should exposure to hydrogen phosphide be documented or suspected, remove patient from gas atmosphere to open air. Call a physician immediately. Have the patient lie down, keeping him warm and comfortable. Treat as for shock. Make no antidotal use of fats, oil, butter or milk. Do not administer atropine as it is contraindicative. Begin artificial respiration if breathing has ceased. When exposure to low concentrations of hydrogen phosphide has been documented or suspected, the individual involved should rest for 24 hours, and under no circumstances should he resume any work dealing with fumigation. If ingested, induce vomiting by touching the back of the throat with a blunt object.

Storage

Tablets are received in resealable flasks. As long as flasks remain intact, the storage life of the product is unlimited. Storage should be in a dry, locked, ventilated area and out of the reach of children and irresponsible persons.

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Pounce/Ambush/Perm-UP

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pounce (PCP# 19688)	FMC Corporation	Permethrin: 384 g/L	Emulsifiable concentrate	1 L
Ambush (PCP# 14883)	AMVAC	Permethrin: 500 g/L		1 L
Perm-UP (PCP# 28877)	United Phosphorus Inc.	Permethrin: 384g/L		1 L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre		Specific comments
		Pounce/ Perm-UP	Ambush	
Barley, oats, rye, wheat	Pale western cutworm	73 - 158 mL	57 - 121 mL	Apply up to the 5-leaf stage. Under dry soil conditions or where cutworms are large (2.5 - 4 cm), use higher rate of product. Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest.
Canola, corn, flax, lentils, peas, potatoes, sugar beets, sunflowers,	Army cutworm, black cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm	73 - 158 mL	57 - 121 mL	
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug	73 - 105 mL	57 - 80 mL	Use the higher rate for heavy infestations. Repeat as necessary.
Sweet corn	European corn borer, corn earworm	111 - 152 mL	NR*	Use the higher rate when severe insect pressure is anticipated. Spray no later than when first feeding is seen on the foliage. For second brood borers in late plantings, apply before tassels show.
	Fall armyworm	73 mL	NR*	
Canola	Crucifer flea beetle	36 - 73 mL	28 - 57 mL	

* Not registered.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Apply sufficient water for thorough coverage of foliage. See label for details on water volume.

Application Tips

For control of corn earworm: Spray to ensure coverage of ears and silk. European corn borer control: Consult with company representative for proper timing of spray. Cutworms: Do not disturb soil surface for 5 days after application.

How it Works

Works by contact and as a stomach poison on a wide range of pests. No systemic or fumigant activity.

Restrictions

Grazing: Cover crop or crop treated with permethrin should not be used as a green feed for animals. **Pre-harvest Intervals**: Do not apply later than 1 day before harvest.

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Environmental Precautions

Permex/Ambush/Permo-UP is moderately to highly toxic to aquatic organisms, including fish. Avoid contamination of aquatic systems during application. Avoid drifting of spray onto any body of water or other non-target areas. Do not apply by any ground application within 15 metres or by any aerial application within 100 metres of any body of water.

Toxicity

Oral LD_{50} (rats): Ambush 500 EC = 3,000 mg/kg; Permex EC/Permo-UP = 1,939 mg/kg. Toxic to bees.

Storage

Keep product away from fire, open flame, electric light bulbs and other sources of heat. Minimum storage temperature for Ambush is 0°C and Permex is 12°C.

Pyrifos 15G

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Pyrifos 15G (PCP# 29048)	Loveland Products Canada	Chlorpyrifos 15%	Granular	25.7 kg

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate	Specific comments
Corn	Larvae of northern and western corn rootworms (control), cutworm larvae (suppression)	75 g per 100 m of Row	Do not apply within 10 days of harvest. Incorporate granules in top 2.5 cm of soil
Potato (In-furrow)	Wireworm	3.1 kg per 100 m row	Do not apply within 10 days of harvest

Application Information

Ground application only. See label for information on row spacing, amounts to be applied and equipment calibration.

Application Tips

Do not apply to heavy soils. Not more than one application per season.

How It Works

Chlorpyrifos is an organophosphate that is a cholinesterase inhibitor.

Restrictions

A plant-back interval of 10 days must be observed between application and planting of rotational crops.

Environmental Precautions

Toxic to birds, certain beneficial insects (bees), wild mammals, fish and aquatic organisms. Do not contaminate water, food or feed by storage or disposal.

Toxicity

Oral LD_{50} (rats) = 409 mg/kg. Dermal LD_{50} (rats) = >2,000 mg/kg.

Storage

Avoid heating above 60°C. Contains petroleum distillates solvent and will burn.

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Sevin XLR

[redacted]

Formulations

Product	Example	Active ingredient	Formulation	Common use
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Groups, Insects Controlled and Rates

Crop	Insects controlled	Rate per acre	Specific comments
Alfalfa, clover, barley, oats, rye, wheat	Brown marmo, flea beetles, leafhoppers, three-cornered alfalfa hopper	[redacted]	Apply when insects or their damage appear. Repeat in [redacted] days if necessary.
	Alfalfa caterpillar, armyworm, cutworms	[redacted]	
	Grasshoppers	[redacted]	
Beans	Mexican bean beetle	[redacted]	Apply when insects or damage appear. Repeat at intervals of [redacted] days or as necessary.
	Pea beetle, leafhopper	[redacted]	
	Lygus bugs, stink bugs	[redacted]	
	Climbing cutworms	[redacted]	Spray in [redacted] on stem over row.
Corn (field and sweet)	Corn earworm, northern corn rootworm (adults), European corn borer, fall armyworm	[redacted]	For larvae in whorls and for foliage feeders, treat the entire plant. Repeat as necessary. For insects attacking ears and ears, apply at intervals of [redacted] days starting when first silks appear and continuing until silks begin to dry.
	Grasshoppers	[redacted]	
	Lonestar cockroach	[redacted]	Spray in [redacted] on stem over row.
Cowpea, including [redacted]	Pea beetle	[redacted]	Applications may be made up to [redacted] before harvest.
Cockroaches, field borders, forage grasses, headlands, pastures, rangelands, rights-of-way, wastelands	Grasshopper – nymphs or [redacted]	[redacted]	
	Grasshoppers – adults or [redacted]	[redacted]	
Peas	Alfalfa looper	[redacted]	Apply when insects or damage appear. Repeat at intervals of [redacted] days or as necessary.
Peanuts	Lesser [redacted]	[redacted]	Apply when insects or damage appear. Repeat at intervals of [redacted] days or as necessary.
	Peanut flea beetle, leafhopper	[redacted]	
	Tarnished plant bugs	[redacted]	

Application Information

How to Apply: Ground and aerial applications. **Water Volume:** Ground: [redacted] spray minimum. Aerial: [redacted] spray minimum.

Application Tips

Timing and good coverage are essential for effective control. Sevin XLR applications are more resistant to washoff when applied as a concentrated suspension. To ensure washoff resistance, apply dilutions of [redacted] Sevin XLR at no greater than [redacted] water. Applications should be made to dry foliage to maximize washoff resistance.

Purchase this product without a Crop Protection [redacted] for only $[redacted]. Buy it now at [redacted]

Over 5 Years

A collagen rejuvenator that works to restore optimum hydration. Produces a rapid increase of active cells working to long-lasting effects every 21 days or so. Results depending on original condition. Sometimes can require multiple treatments. Limited to a specific time for surgery or cosmetic access (i.e. 30 days after application).

Restrictions

Contraindications Do not apply just before sun. **Caution** Always use fresh soap, sensitive/broken skin. Yes, you can, but be careful of hypersensitive to sun or heat for some. Example of these after treatment can have problems if injured after treatment without washing, or illegal conditions or with or sauna. Reason is water from sun or for pain or. Treated foreign and fresh soap may be not to avoid, prevent can prevent for daughter you don't agree to, applied to discover. Also cells may be considered to range / see after applications, don't, cells / also / also applies to. **Pre-Approval Information** days to. Radio / 24h, cell, no, check / 12, your / 1, Avoid / 1, cell / 1, condition / 1 / 24/48h / skin and / 1, things prevent, skin only work, patients, complexion / 1.

Environmental Precautions

Do not apply when weather conditions by-by yourself or dust. Do not contaminate surface or ground water. Do not apply directly to water or to areas where surface water is present. **Avoid** Do not apply in direct to skin to blowing, dogs or inside if there are existing the treatment area.

Capacity

Small (S_case) = 144 mg/kg. Normal (N_case) = = 1440 mg/kg. Focus on them.

Storage

Do not store where temperature fluctuate outside 36°C. Oil formulations will withstand freezing.

Superior 70 Oil

Formulations

Product	Category	Active Ingredient	Presentation	Shelf Life
Superior 70 Oil (CAS# 64991-83-8)	Lubricant Products Topical	Mineral oil, 70%	Liquid	2 y (< 5 days)

Drugs, Insects Controlled and Dose

Drug	Insect Controlled	How Low (MI in mm)	Specific Instructions
Phenol	Aphids	1 % solution Use 1% of product per 100 L of water	Superior 70 Oil is used to reduce the spread of Potato Virus Y (PVY). Apply to susceptible plants. Spray to run-off. Use low volume spray equipment to ensure

Application Information

Dose to Apply Consult application code. Do not apply to an **Water Volume** 10 L/ acre.

Application Tips

Thorough coverage is essential. Do not apply Superior 70 Oil in areas experiencing drought stress to maximize. Do not apply just before or during freezing weather or in direct sunlight. Do not use within 14 days before or after using sulphur.

Restrictions

Pre-Approval Interval: Potato: Do not apply within three (3) days or harvest.

Environmental Precautions

Toxic to aquatic organisms. To reduce runoff from treated areas use appropriate methods, such as applications to dense crop, a windbreak or dense drags, compacted soils or clay. Avoid applications when there is risk to livestock.

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Validity
Rank (X)_ caster secs: 1 (HS) mg/dg; forward (X)_ caster: 1 (HS) mg/dg

Warnings
Do not have before 177, or save hours or Rules

Thiomet 10 G

Accumulation

Product	Dosage	Administration	Duration	Notes
Thiomet 10 G	10 mg/day	Oral	14 days	14 day

Drugs, Insects Controlled and Risks

Drug	Interaction	Mechanism	Management
Thiomet	Metoprolol	Increased plasma concentration	Monitor for signs of toxicity; reduce dose if needed

Classification Information
Must be legible. Apply until possible symptoms applications

Classification Type
Prolapse: Do not place no device contact until the cord. Do not use to warm units. Do not apply in the skin not specified in the label.

Drug & Device
Cytotoxic, hypersensitive reactions with effects noted isolated and to against and severe side effect orthopedic

Restrictions
Caution: Known to squeeze a cups. Ranitidine, the effect of several studied is not appreciable. Cleaning: Do not to prepare fittings, unless of risk, or treatment. Warnings: Do not use in effect, unless to note tested these during the instruction side, store in a of these.

Environmental Precautions
The product is legally sure to note, avoid exposure. PPE get against not to these. Use spilled in a special powder area for transportation and the unit is effective to, revealed up from the unit surface.

Validity
Rank (X)_ caster: 1): 1 mg/dg; forward (X)_ caster: 1 (N) mg/dg

Warnings
Do not use to store in a covered for these. Store warnings to direction, avoid these or from, plastic bags.

Rhizovax EC/Rhizovax 10 SC WSP

Rhizobium spp.

Formulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per [illegible]	Rate per [illegible]	Insects controlled
[illegible]	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

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[redacted]

Verimark

Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Verimark (PCP# 28892)	E.I. duPont Canada	Cyantraniliprole 200 g/L	Suspension	5 X L

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate	Specific comments
Potato	Colorado potato beetle Potato flea beetle (early season control of spring adults)	1.75 to 3 mL per 100 metre of row (b) 350 to 600 mL per acre (based on 92 cm row spacing) Seed piece treatment (potatoes only): 45 mL per 100 kg of seed pieces (b) 438 mL per acre (based on 2200 kg/ac planting rate)	In-furrow application: Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces in the furrow. Thorough coverage of seed pieces is important to obtain optimum control. Potato seed piece treatment: Apply in areas with adequate ventilation or areas equipped to remove spray mist or dust. Good coverage of the seed piece is required for optimal control. Following an application of Verimark insecticide, application of a fungicide potato seed treatment or inert dust is recommended.

Registered Tank Mixes

None registered.

Application Information

Mix with water for application as in-furrow spray or seed-piece treatment with appropriate equipment. Always add Verimark to water; never put Verimark into a dry tank or other mixing equipment without first adding water. Mix thoroughly; once dispersed, continued agitation is required. Spray mix should not be stored overnight in the spray tank.

Application Tips

When pest populations are expected to be high, use the highest listed application rate for that pest. Coverage is important to obtain optimum control. Do not make more than one soil or seed-piece application per season. Do not exceed a total of 0.667 litres Verimark per acre per season.

How it Works

After exposure to Verimark, affected insects will rapidly stop feeding, become partly exit, and typically die within 1 – 3 days.

Restrictions

Do not make a subsequent foliar application of any Group 28 insecticide for a minimum of 60 days following an in-furrow application planting of seed pieces treated with duPont Verimark insecticide. **Colorado Potato Beetle Resistance Management** Do not apply any Group 28 insecticide for Colorado Potato Beetle control if Verimark was used at planting as in-furrow or seed-piece treatment. **Re-cropping:** Plant-back intervals (PBI) for rotational crops range from 0 to 365 days. See the label for information on PBI for specific crops.

Environmental Precautions

Verimark is toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by the cleaning of equipment or disposal of wastes. Toxic to bees. This product is systemic, and bees can be exposed to product residues in flower leaves, pollen and/or nectar resulting from soil applications. However, when this product is applied and used according to label directions, the risk to bees is expected to be negligible.

Toxicity

Low acute toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides. Load, eye, food or feed. Keep container closed.

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Insecticide Selector Chart

Cereals

Products	Chlorpyrifos[1,2,3]	Coragen	Cygon/Lagon	Decis	Delegate	Eco-Bran	Laminate	Malix	Malathion	Matador/Silencer	Prairie/Perm-UP/Ambush	Sevin XLR
Wheat, barley and oats												
aphids			C						C			
brown wheat mite	C											
cereal leaf beetle									C			
cutworms	C	C		C				C[4]			C[4]	
grasshoppers	C	C	C	C		C		C	C	C		C
thrips			C				C					
true armyworm	C	C			C		C		C	C		C
wheat midge[1,2]	C		C									
wireworm												
Fall rye												
aphids									C			
cutworm											C	
grasshopper			C			C			C			C
true armyworm									C			C

C = Control, S = Suppression

[1] Wheat and barley only

[2] Wheat only

[3] Chlorpyrifos products include Lorsban 15T, Pyrinex, Nufos, Citadel, Warhawk 480 EC, NuPower Krypton

Forages, Pasture and Rangeland

Products	Coragen	Cygon/Lagon	Decis	Dibrom	Eco-Bran	Malix	Malathion	Matador/Silencer	Oberon	Sevin XLR
Forages										
Alfalfa										
alfalfa weevil			C				C	C		
aphids		C		C			C	C		
blotch leafminer		C					C			
grasshopper		C					C	C		C
leafhopper		C		C			C	C		
lygus bugs		C	C	C			C	C		
plant bugs		C						C		
spider mites							C			
spittle bug							C			
two-spotted spider mite									C[1]	
Clover										
aphids							C[2]			
leafhoppers							C[2]			
spider mites							C[2]			
sweet clover weevil		C					C			
grasshoppers							C[2]			
Timothy										
grasshoppers								C		
Forage grasses										
grasshoppers	C									C
Pasture, rangeland, headlands and roadside										
grasshoppers	C	C	C	C	C	C[3]	C	C		C

[1] Alfalfa grown for seed production only

[2] Only registered for Malathion 85E

[3] Headlands and roadsides only

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Insecticide Selector Chart

Oilseeds

Products	Chlorpyrifos*	Coragen	Cygon/Lagon	Decis	Eco-Bran	Lannate	Mako	Malathion	Matador/Silencer	Monitor	Pounce/Perm-Up/Ambush	Sevin
Canola (including herbicide tolerant)												
alfalfa looper	C					C						
aster leafhopper			C									
beet webworm				C		C						
Bertha armyworm	C	C		C		C	C		C	C		
cabbage looper		C				C						
cabbage seedpod weevil				C					C			
clover cutworm				C		C						
cutworm	C	C					C				C	
diamond-back moth (larvae)	C	C		C				C	C			
flea beetle				C			C	C	C		C	C
grasshopper	C		C	C	C		C	C	C	C		
lygus bugs	C			C					C			
red turnip beetle												
true armyworm	C											
turnip aphids			C									
variegated cutworm	C											

Products	Chlorpyrifos*	Coragen	Cygon/Lagon	Decis	Eco-Bran	Lannate	Mako	Malathion	Matador/Silencer	Monitor	Pounce/Perm-Up/Ambush	Sevin
Flax												
beet webworm				C								
Bertha armyworm	C	C				C						
clover cutworm				C								
cutworm	C	C		C			C				C	
grasshopper				C				C	C			
true armyworm												
variegated cutworm	C											
potato aphid			C									
Mustard												
beet webworm				C								
Bertha armyworm		C		C					C			
cabbage seedpod weevil				C					C			
clover cutworm				C								
diamond-back moth (larvae)		C		C				C	C			
flea beetle				C				C	C			
grasshopper				C				C	C			
lygus bugs				C					C			
red turnip beetle												

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, MPower Krypton

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Insecticide Selector Chart

Sugar Beets

Products	Chloryrifos*	Closer	Decis	Malathion	Pounce/PermUP/Ambush	Thiodan/Thionex EC
Sugar beets						
aphids		C				C
cutworm	C		C		C	
flea beetle				C		

Pulses

Products	Chlorpyrifos*	Cygon/Lagon	Decis	Lannate	Malathion	Matador/Silencer	Pounce/Perm-UpAmbush	Sevin XLR
Peas								
alfalfa looper				C				C
cutworm						C	C	
grasshoppers						C		
leafhopper					C			
pea aphids		C		C	C	C		
pea leaf weevil						C		
spider mite					C			
Lentils								
cutworm	C		C			C	C	
grasshopper	C		C		C	C		
lygus bugs						C		
pea aphids						C		
potato leafhopper						C		
Chickpeas								
cutworm						C		
grasshopper						C		

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, MPower Krypton

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Insecticide Selector Chart

Potatoes

Products	Actara	Admire/Alias/Grapple/Grapple$_2$	Agri-Mek SC	Assail	Beleaf	Chlorpyrifos*	Closer	Clutch	Concept	Coragen	Cygon/Lagon	Decis	Delegate	Dibrom	Imidan
Potatoes															
aphids	C	C		C	C		C	C	C		C				C
cutworm						C									
Colorado potato beetle	C	C		C		C		C	C	C		C	C	C	C
European corn borer									S	C			C		
leafhoppers	C	C						C	C		C	C		C	C
potato flea beetle		C				C			C			C		C	C
variegated cutworm															
wireworms															
spider mites			C												
tarnished plant bug						C			C			C			

(continued)

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, MPower Krytpton

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Insecticide Selector Chart

Potatoes *(continued)*

Products	Lannate	Mako	Malathion	Matador/Silencer	Minecto Duo WG	Monitor	Movento	Orthene	Pounce/Perm UP/Ambush	Pyrifos	Rimon	Sevin XLR	Superior 70 Oil	Thimet 20G	Thionex	Titan	Verimark
Potatoes																	
aphids	C		C		C	C	C	C					C		C	C	
cutworm		C							C								
Colorado potato beetle		C	C	C	C	C			C		C	C			C	C	C
European corn borer											C	C					
leafhoppers	C	C	C	C	C	C		C	C			C			C	C	
potato flea beetle	C	C		C	C	C		C	C			C			C	C	C
variegated cutworm	C	C															
wireworms										S				C		S	
spider mites			C														
tarnished plant bug				C				C	C			C			C		

C = Control, S = Suppression

[1] Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, MPower Krytpton

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Active ingredient names for registered products can be found in the *Seed Treatment Fungicide Group Classification by Mode of Action* table starting on page 436

Seed Treatment Index

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Methods of seed treatment 435

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NipsIt INSIDE 600 Insecticide	465		

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Seed Treatment of Cereal, Forage, Oilseed and Pulse Crops

Purpose of seed treatment

Seed treatment provides economical insurance against many diseases and some insect pests of seed and seedlings. Chemical treatment can give seedlings a head start by preventing or reducing damage resulting from certain crop pests.

Diseases are controlled by contact fungicides that destroy fungi carried on the seed, such as common bunt of wheat, the surface-borne smuts of barley and oats, fungus stripe of barley and some leaf-spotting and seed decay fungi. Systemic fungicides destroy fungi carried in the seed, such as loose smut of wheat and barley, and they protect the early growth of the seedling.

Specific recommendations:

- Rye and flax should be treated because they are very susceptible to seed decay.
- Winter wheat should be treated to prevent bunt and seed decay as well as to promote good seedling growth.
- If bunt or smut was observed in a crop that will be used for seed, the grain should be treated. If a variety is grown that is susceptible to bunt or smut and the presence of the disease is uncertain, it may be wise to treat the seed annually or every second year, depending on the susceptibility of the variety.
- Canola should always be treated to control the seed-borne phase of blackleg.
- Alfalfa seed is treated to control verticillium wilt.

Insecticidal seed treatment will prevent or reduce damage caused by certain crop pests.

Methods of seed treatment

Custom treatment

Fungicides are applied to the seed sometime before planting. Seed cleaning plants are equipped to treat seed with liquid fungicides. Canola can only be treated by custom applicators as there are no farmer-applied seed fungicides available. Farmers can use a variety of methods for both liquid and dry formulation applications.

Precautions

- **read** and **follow** label directions carefully
- **treated** seed must not be allowed to contaminate grain intended for food, feed or commercial use
- **bury** leftover treated seed or store it safely in labelled bags for future use as seed
- **treated** seed offered for sale must be labelled with the name of the treated chemicals (Canada Seed Act)
- **treated** seed in transit must be bagged or bulk loads tarped to prevent spillage

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Seed Treatment Fungicide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Found in			
Group 1	**Inhibition of mitotic formation.**				
Benzimidazole	thiabendazole	Apron Advanced	Cruiser	Sterling® 50	
	thiophanate-methyl	Senator 70DF®			
Group 2	**Succinate dehydrogenase inhibitors.**				
Anilide	difenoconazole	Cruiser Maxx Vibrance Cruiser®	Cruiser Maxx Potato Extreme® Cruiser Vibrance Quattro®	Kabu Vibrance® Vibrance IS	Vibrance IS Vibrance Quattro
	penflufen	Vibrance Cereals®			
	sedaxane	Vibrance Cereals®			
	fluopyram	Saltro®			
	penthiopyrad	Vibrance Cereals®			
	fluxapyroxad	Vibrance Cereals®			
	isopyrazam	Vibrance Cereals®			
Group 3	**Demethylation inhibitors.**				
Triazole	tebuconazole	Raxil 10SD	Raxil Pro Shield®	Raxil 4DM®	
		Raxil Pro	Raxil 1		
	triticonazole	Trimax	Charter 6FS	Insure Cereal	
		Trimax 6FS	Sentor		
	metconazole	Kinetic® Canada	Kinetic® Canada Seed Protection®		
	prothioconazole	Kinetic Silver	Raxil Pro	Titan Kinetic®	
		Evertol Energy	Raxil Pro Shield		
Group 4	**Phenylamides. Affects RNA synthesis.**				
Acylalanine	metalaxyl	Allegiance-FL	Evertol Energy	Prosper Cereal®	Vibrance IS
		Raxil Pro 2.7 FS	Insure Cereal	Raxil 10SD	Vibrance Quattro
		Cruiser Vibrance Quattro®	Kinetic Silver Canada Seed Protection®	Raxil 4DM	
	metalaxyl-M	Apron Advanced	Cruiser Maxx	Cruiser Maxx	Kabu Vibrance®
		Apron Maxx 6FS	Vibrance Beans®	Vibrance Potato®	Vibrance IS
			Cruiser Maxx Vibrance Cereals	Evertol IS 4FS	
Group 7	**Succinate dehydrogenase. Inhibits mitochondrial function**				
Carboxamides	carboxin	Crown	Lowland Vitaflo	Vitaflo 280	
		Saxotro CS FL®	Raxonare 6FS	Vitaflo 6P	
	penflufen	Evertol Silver	Prosper Cereal®	Vitax Evergol	
		Evertol Energy	Titan Kinetic®		
	sedaxane	Cruiser Maxx Vibrance Beans®	Cruiser Maxx Vibrance Cereals®	Cruiser Vibrance Quattro®	Kabu Vibrance® Vibrance Quattro Vibrance IS
Group 11	**Enolpiluvate type active and resistance. Inhibit mitochondrial respiration.**				
Strobilurin	orfisocarbin	Prosper Cereal®	Vitax IS	Vitax Evertol	
	pyraclostrobin	Insure Cereal			
Group 12	**Phenylpyrroles.**				
Phenylpyrroles	fludioxonil	Apron Advanced	Cruiser Maxx	Cruiser Vibrance	Maxim Liquid FCP
		Apron Maxx 6FS	Vibrance Beans®	Quattro®	Maxim MZ FCP
		Cruiser Maxx Potato Extreme®	Cruiser Maxx Vibrance Potato®	Kabu Vibrance® Maxim IS	Prosaro Vibrance Quattro
Group 21					
Thiazole carboxamide	ethaboxam	INTEGO Solo			
Group M	**Multi-site activity**				
Dithiocarbamates	mancozeb	MancoFlow FCP®	Polaris DT 1L	Tolerasol FCP®	
		Maxim MZ FCP	Solax 1DC		
	thiram	Saxotro 480®	Sentor	Raxil T	Vitaflo 280
		Saxotro CS FL®	Lowland Vitaflo	Thiram 75WP	Vitaflo 6P
Phthalimide	captan	Agrox S 2®	Agrox CP®	Agrox FL	M-T

* Contains fungicide and insecticide combination. Information on insecticide Mode of Action can be found in the insecticide section.

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Agrox fl

[redacted]

Formulations

Product	Company	Active ingredient	Formulation	Container size
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Crops, Diseases Controlled and Rates

Crop	Disease	Rate per 20 kg seed
[redacted]	[redacted]	[redacted]
[redacted]		[redacted]
[redacted]		[redacted]
[redacted]		[redacted]
[redacted]		[redacted]

[redacted]

Registered Tank Mixes

[redacted]

Application Information

[redacted]

Crop & Weeds

[redacted]

Restrictions

[redacted]

Environmental Precautions

[redacted]

Toxicity

[redacted]

Storage

[redacted]

[redacted]

Alias 240 SC

Formulations

Product	Packaging	Active ingredients	Concentration	Container size
Alias 240 SC [PCP# 30478]	1 gallon plastic bottle	2-chloro-N-[4-(4-chlorophenoxy)-2,5-difluorophenyl]-3-pyridinecarboxamide	2 lb/gallon	1 gal

Crops, Diseases Controlled and Rates

Crop	Insects controlled	Rate per Acre to Use
Whole leaves spring onions, variety, late	Whiteflies, early season symptoms applied in the nursery	Light infestations: 4 - 8 fl oz Moderate to high infestations: 8 - 16 fl oz

Registered Tank Mixes

Crop	Tank mix compatible insecticide	Rate per acre of tank mix product	Specific instructions
Whole leaves spring onions, variety, late	Tank A	1.25 - 2 fl oz	Tank mix must be applied in sufficient spray to provide uniform distribution of spray
	Tank AB	50 - 2 fl oz	

Application Information

Alias 240 SC can be applied to most spring vegetable and commercial ornamental greenhouse. Do thoroughly, and closely read to completely - coverage of the crop of treatment. Treated perennial - reflect and fiber or wood beds. Reapplications of wood and new be required.

Crop & Rotation

Avoid treated pre-dew conditions. Heat damage - caused by - thinning and activity insects through contact with a tender and dry.

Restrictions

Do not apply - any subsequent applications of a Group 3 insecticide crop, foliar applications before crop a wood treatment applications over Alias 240 SC. Do not use treated wood for mulch or feed.

Grazing: Do not graze or feed livestock or treated areas for three weeks after planting.

Environmental Precautions

Avoid exposure to use or aquatic environment and field. Drugs use of Alias, process, people or other aquatic or spray applied or a spread swath. Apply by aerial equipment into dry soil or a treating from the soil surface. Soil is to treated and should be avoided or prevent the broadcast or treated spray. Keep water sources such as lakes, streams, ponds or other aquatic systems.

Mixing

Add 1/2 - water - 1/2 - 1/2 - 1/2 fl oz/gallon. Spread 1/2 - additive - 1 fl oz/gallon.

Storage

Store in cool, dry place. Store in original container preferably in a locked storage area.

Allegiance® FL Refinement 2.7 FS

Formulations

Product	Type	Recommended Rate	Comments	Restrictions
Allegiance® FL Refinement 2.7 FS	Acid Formulation	Minimum 1.0 oz/A	Acid Formulation	30 Days
Allegiance® FL Refinement 2.7 FS	Premix			30 Days - Hay - Beef

Crops - Diseases - Application and Rates

Crop	Disease	Minimum Rate	Maximum Rate	Restrictions
Soybean, Edamame	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days
Canola, Industrial Rapeseed, Mustard	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days
Barley, Corn (Field, Pop), Oats, Rice, Sorghum, Wheat	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days
Peanut, Sunflower	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days
Sugarbeet	Apply at the seedling stage before canopy closure	1.0 fl oz/A	1.0 fl oz/A	30 Days
Leaf Vegetables*	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days
Soybean	Apply at the seedling stage before canopy closure	1.0 fl oz/A	1.0 fl oz/A	30 Days
Dry Bean, Lentil	Apply at the seedling stage	1.0 fl oz/A	1.0 fl oz/A	30 Days

* Apply only before heavy rollers. ** Do not use on land with labeled for use in rotational crops.

Registered Turf Sites

Golf, Sod Farm

Application Information

Mix with water in spray tank. Add surfactant. Crop oil concentrate may be added to the tank prior to application at a rate. Use recommended surfactant rate for applicable acid forms. Use a full flat fan or a single application at 40 mph.

Crops Intended for Export

If the crop is intended for export, consult with the importer for additional information on Allegiance FL can be used on the crop in their country. For commodity specific tolerances.

Application Tips

Do not use on recommended rate.

Crop Rotation

Allegiance FL is a broad-spectrum herbicide that is absorbed into the growing point and is translocated throughout the growing point, stem tissue, roots of susceptible weeds.

Restrictions

Grazing: Do not graze or cut forage for animal feed within 30 days after planting. Treated soil must not be used for food, feed or silage.

Environmental Requirements

Ensure the test area is well-ventilated and free from flammable materials. Maintain a temperature range between 15°C and 25°C (59°F and 77°F). Avoid exposure to direct sunlight or moisture during the procedure.

Safety

Wear appropriate personal protective equipment (PPE), including gloves and safety glasses. Ensure the power supply is disconnected before handling any components.

Storage

Store the diagnostic kit in a cool, dry place away from direct sunlight. Keep all components organized and labeled to prevent misplacement. Refer to the storage guidelines in Section 1.7.9 for additional information.

Approval Authority

Responsibility

Activity	Responsible	Approval	Notification	Time Limit
Approve Diagnostic Procedures	Supervisor	Department Head	Quality Assurance	5 days
		Safety Officer		

Scope, Processes, Control Effect, and Effects

Activity	Control Effect	Effects	Time Limit
Review	Ensure all diagnostic procedures comply with safety standards. Verify that all necessary documentation is included. Check for any potential risks or hazards. Confirm that the procedures are clear and understandable. Assess the feasibility of the procedures in the current environment. Evaluate the qualifications of personnel performing the procedures. Review the calibration status of equipment used in the procedures. Ensure that all steps are documented accurately. Identify any missing or incomplete information. Provide feedback for improvements or corrections.		10 days
Audit	Conduct regular audits of diagnostic procedures. Ensure compliance with established protocols. Identify any deviations from the procedures. Assess the effectiveness of corrective actions taken. Review audit findings with relevant personnel. Maintain records of audit results and follow-up actions. Evaluate the overall quality of diagnostic procedures. Recommend changes to improve procedures. Ensure that all personnel are aware of audit findings. Schedule follow-up audits to verify implementation of changes.		

Registered Vault Effects

Vault Manager and the vault owner's Vault Trustee (VT) for a record are automatically

Application Administration

Login - VT or its agent, the vault administrator, VT has a Vault Key, which allows access to all Vault Records. VT may establish Vault Trustees (VTs) for a vault. VTs have the same rights as VT, except they cannot establish other VTs. VT may establish Vault Agents (VAs) for a vault. VAs have the same rights as VT, except they cannot establish VTs or VAs. VT may establish Vault Auditors (VAs) for a vault. VAs have the same rights as VT, except they cannot establish VTs or VAs. VT may establish Vault Agents (VAs) for a vault. VAs have the same rights as VT, except they cannot establish VTs or VAs.

Vault Availability and Accessibility - Vault Records are available to VT and Vault Agents 24 hours a day, 7 days a week, except for scheduled maintenance or emergency maintenance. Vault Records are available to VT and Vault Agents 24 hours a day, 7 days a week, except for scheduled maintenance or emergency maintenance. Vault Records are available to VT and Vault Agents 24 hours a day, 7 days a week, except for scheduled maintenance or emergency maintenance.

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[illegible]

[illegible]

[illegible]

[illegible]

Apron Maxx RTA (cont'd)

Crops	Diseases controlled	Rate per 100 kg seed
Peas (field and marrowfat)[1]	Seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed/coleoptile necrosis and foot rot caused by *Ascochyta pinodes*	325 mL
	Seed/stem necrosis/blight and foot rot caused by *Botrytis cinerea*	
Soybeans[1]	Damping-off and seed rot caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	
	Seedling blight caused by *Fusarium* spp. and *Pythium* spp.	
	Seedling rust rot caused by *Fusarium* spp.	
	Seed rot and seedling blight caused by seed borne *Phomopsis* spp.	
	Early season rust rot caused by *Phytophthora megasperma* var. *sojae*.[2]	
Sunflowers[1]	Seed rot/pre-emergence damping off, post-emergence damping off and seedling blight caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp.	

[1] Registered under Use Restricted Water Use Label Expansion program. [2] Based on 6,000 soybean seeds per hundred. [3] Apron Maxx RTA provides early season protection against *Phytophthora* root rot for labeled varieties of soybeans. If target fields have a history of high *Phytophthora* pressure, or susceptible varieties are to be seeded then tank mix 225 mL of Apron Maxx RTA with 31 mL of Apron XL (3 fungicide per 100 kg of seed.

Registered Tank Mixes

Apron Maxx RTA can be tank mixed with Cruiser 5FS to produce Cruiser Maxx Pulses.

Application Information

Apron Maxx RTA is a ready-to-apply seed treatment for use in commercial seed treatment plants and for on-farm treatment. Apron Maxx RTA may also be used in treat-on-the-go air seeders. The equipment must provide uniform coverage on the seed. Allow the seed to dry before bagging, storing or seeding.

Seed Treatment and Inoculants

Apron Maxx RTA can be used with some Rhizobium-based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. With rough-coated seed, the addition of water to Apron Maxx will increase coverage; contact Syngenta for more information.

How It Works

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for four weeks after planting. **Re-cropping:** Do not plant any crop other than soybeans, beans, chickpeas, lentils, lupins, faba beans and peas within 30 days to fields in which treated seeds were planted.

Environmental Precautions

Apron Maxx RTA is toxic to fish and other aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) > 5,050 mg/kg. Dermal LD_{50} (rabbit) > 2,020 mg/kg.

Storage

Heated storage required. Do not store Apron Maxx RTA above 30°C. Store product in original container.

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Charter RTU/Armour RTU/Armour

Fungicide Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Armour (PCP# 28296)	Lowland Products Canada Inc.	Triticonazole: 25 g/L	Liquid	2.1 - 200 L
Armour RTU (PCP# 30226)		Triticonazole: 16.8 g/L	Liquid	0.1 - 1000 L
Charter RTU (PCP# 29668)	BASF Canada	Triticonazole: 16.8 g/L	Liquid	9.3 L, 200 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Diseases suppressed*	Rate per 100 kg seed	
			Armour	Armour RTU/ Charter RTU
Wheat	Seed rot caused by *Fusarium* sp., seedling blight caused by seedborne *Fusarium* sp., loose smut, common bunt	*Fusarium* crown and root rot, *Cochliobolus* (common) root rot, seedling blight caused by *Cochliobolus sativus*	200 mL (300 mL diluted product)	300 mL
Barley	Seed rot caused by *Fusarium* sp., seedling blight caused by seedborne *Fusarium* sp., true loose smut, covered smut, false loose smut	*Fusarium* crown and root rot, *Cochliobolus* (common) root rot, seedling blight caused by *Cochliobolus sativus*		
Oats	Loose smut, covered smut, seed rot caused by *Fusarium* sp., seedling blight caused by seedborne *Fusarium* sp.	*Fusarium* crown and root rot, *Cochliobolus* (common) root rot, seedling blight caused by *Cochliobolus sativus*		

* Suppression is defined as sub-optimal control, which is still of commercial benefit.

Application Information

Armour: Armour is a concentrated seed treatment formulation for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. These formulations can also be used in "On the Go" air seeder treatment systems. Treated seed should not require drying after treatment and can be stored or bagged immediately.

Water Volume: Armour requires the addition of water for application. Recommended dilution is 2 parts Armour to 1 part water for use on wheat, barley, oats.

Armour RTU/Charter RTU: Armour RTU and Charter RTU are ready to use seed treatment formulations for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Armour RTU and Charter RTU can also be used in "On the Go" air seeder treatment systems. No water or dye is required to be added.

How it Works

The active ingredient triticonazole provides systemic, broad spectrum protection against seed and soil-borne diseases.

Restrictions

Do not use treated seed for food, feed or oil processing.

Environmental Precautions

Ensure proper soil incorporation of the seeds. Do not feed treated seed to, or otherwise expose to wildlife or domestic birds. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate water supplies or any body of water with the chemical contained in this seed treatment. Unused or leftover treated seed should not be stored where there is a chance of it becoming mixed with untreated seed. **Leaching**: The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

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Charter RTU/Armour RTU/Armour (cont'd)

Toxicity
Oral LD_{50} (rats) = 2,000 mg/kg. Dermal LD_{50} (rabbit) = 2,600 mg/kg.

Storage
Store in original container away from pesticides, food or feed. Prevent product from freezing.

Crown

Fungicide Group 1, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Crown (PCP# 23430)	Chemtura Canada	Carbathiin: 92 g/L Thiabendazole: 58 g/L	Liquid	10 L, 200 L, 1000 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Rate per 25 kg seed	Comments
Lentil	Post-emergence damping off, seed rot (*Botrytis* and *Fusarium*)	75 - 150 mL	Apply the higher rate when there is a history of high disease pressure in the field.
	Seed-borne ascochyta (*Ascochyta lentis*)	150 mL	
Chickpea	Seed-borne ascochyta (*Ascochyta rabiei*)	75 - 150 mL	Use the higher rate for smaller seed size varieties.

Application Information
Commercial treaters and on-farm auger treating: Crown is added directly to the seed as it enters a mixing chamber or auger. When a grain auger is used for treating, running the auger less than full is key to adequate mixing. **Application to seed in a hopper box or seed drill**: Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the surface of the seed. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. Repeat this procedure until the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying. **Seed treatment and inoculum sticker**: Crown's liquid properties enable this product to perform as a sticker for inoculants. Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the surface of the seed. Read inoculum label before use. Apply the recommended amount of inoculum evenly over the treated seed and mix thoroughly. Repeat this procedure until the hopper box or seed drill is filled. Seed treated with Crown will remain damp for a period of time following treatment. This enables inoculant added to the hopper box or seed drill to adhere uniformly to seed, thus ensuring adequate nodulation of lentil and chickpea seedlings.

How it Works
Thiabendazole, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling.

Restrictions
Grazing: Do not graze or feed livestock on treated areas for four weeks after planting. Do not use treated seed for food, feed or oil processing.

Environmental Precautions
Crown contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Do not contaminate water during application, cleaning of equipment or disposing of wastes. Any spilled or exposed seed must be incorporated into the soil or cleaned up from the soil surface.

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Toxicity
Oral LD_{50} (rats) carbathiin = 3,820 mg/kg; thiabendazole = 3,300 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed. Do not store Crown in direct sunlight. Do not store Crown above 35°C or below 0°C.

Cruiser 5FS

Insecticide Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser 5FS Seed Treatment (PCP# 27045)	Syngenta	Thiamethoxam: 47.6%	Liquid suspension	56.78 L

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Rate per 100 kg of seed	Specific Comments
Wheat and barley	Wireworms	17 mL, 33 - 50 mL	Use the 17 mL/100 kg seed rate for wireworm suppression. For moderate or high wireworm pressure, treat crops at the 33 - 50 mL/100 kg seed. May be applied on-farm or by commercial treaters using closed transfer including closed mixing, loading, calibrating and closed treatment equipment.
	European chafer	50 mL	
Chickpeas, lentils, dry peas, faba beans	Wireworms	17 mL, 33 - 50 mL	Use the 17 mL/100 kg seed rate for wireworm suppression. For moderate or high wireworm pressure, treat crops at the 33 - 50 mL/100 kg seed. May be applied on-farm or by commercial treaters using closed transfer including closed mixing, loading, calibrating and closed treatment equipment.
Dry peas (including field pea)	Pea leaf weevil	50 mL	

Registered Tank Mixes
Cruiser 5FS can be tank mixed with Apron Maxx RTA, Dividend XL RTA and Vibrance 500FS. Follow the more stringent precautionary measures for mixing, loading and applying as stated on both product labels.

Application Information
Ensure product is thoroughly mixed prior to application. Apply Cruiser 5FS Seed Treatment utilizing closed system seed treatment equipment that provides uniform seed coverage. Thoroughly mix the recommended amount of Cruiser 5FS Seed Treatment into the required amount of water for the slurry rate to be used. Maintain constant agitation of the slurry. Allow the seed to dry before bagging or storing into bulk containers. Depending on planting equipment, seed treated with Cruiser 5FS Seed Treatment may not flow through planting equipment at the same rate as untreated seed. Recalibrate equipment before planting treated seed.

How it Works
Cruiser 5FS Seed Treatment belongs to the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. When seed is treated for post-planting protection against registered pests, Cruiser 5FS Seed Treatment will also provide protection during post-treatment storage of the seed against damage from many storage insect pests. Seed treated with Cruiser 5FS Seed Treatment has been tested and found to be effective against rusty grain beetle, saw-toothed grain beetle, red flour beetle, rice weevil, lesser grain borer, European corn borer and Indian-meal moth.

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Cruiser 5FS (cont'd)

Restrictions
Treated seed must not be used for food, feed or oil processing. **Grazing**: Do not graze or feed livestock on seeded area for 45 days after planting.

Environmental Precautions
Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. Do not apply directly to water or to areas where surface water is present. Treated seed is toxic to birds and small wild mammals. Spilled or exposed seeds and dust must be incorporated into the soil or cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 5,050 mg/kg. Toxic to bees.

Storage
Heated storage required. Store product in original container, ideally at temperatures below 30 degrees Celsius.

Cruiser Maxx Potato Extreme

Insecticide Group 4, Fungicide Group 3, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Maxx Potato Extreme (PCP# 31024)	Syngenta	Thiamethoxam: 250 g/L	Liquid suspension	5.54 L
		Fludioxonil: 64.5 g/L Difenoconazole: 123 g/L		

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Black scurf (suppression), stem and stolon canker (*Rhizoctonia solani*) Silver scurf (*Helminthosporium solani*) Fusarium dry rot (*Fusarium* spp.)	20 mL

* Consult product label for seeding rate conversion chart.

Application Information
Store cut seeds between 7 and 10° C. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust. Seed loading onto the belt should be uniform. If the treated seed is to be stored for several days, ensure there is adequate cool air movement through the pile of cut seed potatoes at a relative humidity of 85 - 90%. An inert dust may be used to help suberization. Cut and treated seed should not be piled above 1.8 m in height. Optimal results are obtained if potatoes are planted immediately after being treated. Do not apply more than 190 mL/acre (rate required for seeding rate of 21 cwt/acre). For seeding rates higher than 21 cwt/acre, use Maxim D plus Actara (consult labels for rates).

How to Apply
Apply as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. Thoroughly mix the recommended amount of Cruiser Maxx Potato Extreme into the required amount of water or tank mix partner for the slurry treater and dilution rate to be used. Maintain constant agitation of the slurry during treatment.

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How it Works

Cruiser Maxx Potato Extreme is active against black scurf, stem and stolon canker, silver scurf, and fludioxonil resistant Fusarium dry rot and contains thiamethoxam, a systemic neonicotinoid insecticide that controls listed sucking and chewing insects through contact and ingestion.

Restrictions

Grazing: Do not graze or feed livestock on seeded area for 45 days after planting. Do not use treated seed for food, feed or oil processing. **Re-cropping restrictions**: Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on the label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. The cover crop may not be grazed or harvested for food or feed. For all other crops, a 120-day plant-back interval is required.

Environmental Precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. Treated seed is toxic to birds and small wild animals; any spilled or exposed seed must be incorporated into the soil or collected and disposed of in a safe manner.

Toxicity

Oral LD_{50} > 5,050 mg/kg. Dermal LD_{50} > 5,000 mg/kg.

Storage

Heated storage required. Store product in original container, ideally at temperatures below 30 degrees Celsius.

Cruiser Maxx Vibrance Beans

Insecticide Group 4 Fungicide Group 4, 7, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Maxx Beans (PCP# 28821)	Syngenta	Thiamethoxam: 22.6% Metalaxyl-M: 1.70% Fludioxinil: 1.12%	Liquid suspension	56.78 L (Cruiser Maxx Beans) + 1.45 L (Vibrance)
Vibrance 500FS (PCP# 30438)		Sedaxane: 500 g/L		

Crops, Insects and Diseases Controlled, Rates

Crop	Insects	Diseases Controlled	Rate per 100 kg of seed
Soybeans[1]	Wireworm Seed corn maggot European chafer Bean leaf beetle Soybean aphid*	Control of seed rot/pre-emergence damping-off and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Control of seedling blight caused by *Fusarium* spp. and *Pythium* spp. Control of seedling root rot caused by *Fusarium* spp. Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. Early season root rot caused by *Phytophthora megasperma* var. sojae.[2] Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	195 mL Cruiser Maxx Beans + 10 mL Vibrance

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Cruiser Maxx Vibrance Beans (cont'd)

Crop	Insects	Diseases Controlled	Rate per 100 kg of seed
Dry Beans	Wireworm Seed corn maggot Potato leafhopper* *	Control of seed rot/pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Control of seedling blight caused by *Pythium* spp. Anthracnose caused by seed-borne *Colletotrichum* spp. Seed decay, seedling blight and damping off caused by *Rhizoctonia solani*	195 mL Cruiser Maxx Beans + 10 mL Vibrance

Note

* Early season protection. * * Replaces one (1) application of a foliar insecticide spray.

† Based on 6,600 soybean seeds per kg, Cruiser Maxx Beans Seed Treatment delivers 85 µg of active ingredient (76 µg of thiamethoxam, 5.7 µg of metalaxyl-M and 3.8 µg of fludioxonil) per seed. ‡ Cruiser Maxx Beans Seed Treatment provides early season protection against Phytophthora root rot for tolerant varieties of soybeans. If target fields have a history of high Phytophthora pressure or susceptible varieties are to be treated, then tank mix 195 mL of Cruiser Maxx Beans Seed Treatment with 31 mL of APRON XL ® LS Fungicide per 100 kg of seed.

Registered Tank Mixes

Apron XL LS at 31 mL/ 100kg seed.

Application Information

For use in a closed application system; no open transfer of product is permitted. Apply Cruiser Maxx Vibrance Beans utilizing seed treatment equipment that provides uniform seed coverage. Seed treated with Cruiser Maxx Vibrance Beans Seed Treatment or a combination of Cruiser Maxx Vibrance Beans Seed Treatment and seed inoculants may not flow through planting equipment at the same rate as untreated seed. Recalibrate equipment before planting treated seed. Mixing with inoculants may increase drying time.

Seed Treatment and Inoculants: Cruiser Maxx Vibrance Beans is compatible with Rhizobium-based inoculants. Check with inoculant manufacturer for application details prior to use.

How it Works

Cruiser Maxx Vibrance Beans controls wireworms and other listed insects through contact and systemic activity of thiamethoxam. Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 45 days after planting. Treated seed must not be used for food, feed or oil processing.

Environmental Precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Toxic to bees. Bees can be exposed to product residues, flowers, leaves, pollen and /or nectar resulting from seed treatment applications. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seed must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 5,000 mg/kg.

Storage

Heated storage required. Store product in original container, ideally at temperatures below 30°C.

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Cruiser Maxx Vibrance Cereals

Insecticide Group 4 Fungicide Group 3, 4, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Maxx Vibrance Cereals (PCP# 30438)	Syngenta	Thiamethoxam: 30.7 g/L Difenoconazole: 26.9 g/L Metalaxyl-M: 9.5 g/L Sedaxane: 9.0 g/L	Liquid suspension	10 L, 115 L, 450 L

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Diseases controlled	Diseases suppressed[1,2]	Rate per 100 kg of seed
Barley	Wireworms[3] European chafer[4]	General seed rots[5], seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp. and soil-borne *Pythium*, seed-borne *Septoria*, covered, false loose and true loose smut	Common root rot (*Cochliobolus* spp.), *Fusarium* crown and foot rot, take-all	325 - 650 mL
Wheat, spring	Wireworms[3] European chafer[4]	General seed rots[5], seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp. and soil-borne *Pythium*, common bunt[6] and loose smut	Common root rot (*Cochliobolus* spp.), *Fusarium* crown and foot rot, take-all	
Wheat, winter	Wireworms[3] European chafer[4]	General seed rots[5], seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* or *Rhizoctonia* spp. and soil-borne *Pythium*, seed-borne *Septoria*[7], Septoria leaf blotch[7,8] common bunt[6], dwarf bunt[6], loose smut	Common root rot (*Cochliobolus* spp.), *Fusarium* crown and foot rot, take-all	
Oats	Wireworms[3] European Chafer[4]	General seed rots[5], seedling blight, root rot and damping off caused by seed and soil-borne *Fusarium* or *Rhizoctonia* and soil-borne *Pythium*, covered smut, loose smut	Common root rot (*Cochliobolus* spp.)	325 - 650 mL

[1] The 325 mL/100 kg seed rate of Cruiser Maxx Vibrance Cereals provides suppression of wireworm activity. If pressure is moderate to high or control is required, use 650 mL/100 kg seed to apply 33 g thiamethoxam per 100 kg seed. Alternatively, Cruiser Maxx Vibrance Cereals can be tank mixed with Cruiser 5FS/350FS Seed Treatment insecticide to achieve a total use rate of 33 – 35 g of thiamethoxam per 100 kg seed. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations. [2] For control of European chafer activity on wheat and barley, mix Cruiser Maxx Vibrance Cereals with Cruiser 5FS/350FS Seed Treatment insecticide to achieve a total use rate of 33 g of thiamethoxam per 100 kg seed. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations. [3] Targeted seed rate controlled include those caused by saprophytic organisms such as *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus*. [4] Use the 650 mL rate for control of this disease. [5] Suppression means consistent control at a level that is not optimal but is still of commercial benefit. [6] Controls both seed- and soil-borne bunts (common, dwarf). [7] Early season foliar disease control for first 4 weeks after planting. For full season control, apply a foliar fungicide according to label directions.

Registered Tank Mixes

325 mL per 100 kg of Cruiser Maxx Vibrance Cereals commercial seed treatment may be mixed with 325 mL of Dividend XL RTA if a) there is a history of high disease pressures in the field, b) where field conditions favour seed-borne and soil-borne pathogens, or c) when controlling seed-borne Septoria. For increased wireworm control, Cruiser Maxx Vibrance Cereals can be tank mixed with Cruiser 5FS/350FS seed treatment insecticide.

Application Information

All seed treated with this product must be conspicuously coloured at the time of treatment.

How to apply: The highest rate of Cruiser Maxx Vibrance Cereals is available from commercial treaters for fields with high wireworm pressure. See label for protective equipment when treating or handling treated seed. For more information on higher application rates for high wireworm populations, call 1-87-SYNGENTA.

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How It Works

Cruiser Maxx Vibrance Cereals seed treatment is a combination of the insecticide thiamethoxam and the fungicides difenoconazole, metalaxyl-M (and S-isomer) and sedaxane that controls or suppresses certain insect pests and seed- and soil-borne diseases of cereal crops. Thiamethoxam offers suppression of wireworm activity applied at the recommended rate on seed and young seedlings.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 47 days after planting.

Environmental Precautions

Cruiser Maxx Vibrance Cereals is a water-based seed treatment containing three fungicides and one insecticide. The insecticidal active ingredient, thiamethoxam is slightly to practically non-toxic to fish, birds and aquatic invertebrates on an acute basis but is highly toxic to honeybees and one species of aquatic invertebrate (chironomid). The fungicides metalaxyl-M, difenoconazole and sedaxane are practically non-toxic to slightly toxic to fish, birds, aquatic invertebrates on an acute basis and insects (bees). Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) > > 5,000 mg/kg. Dermal LD_{50} (rats) > > 5,000 mg/kg.

Storage

Heated storage required. Do not store above 30° C. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application.

Cruiser Maxx Vibrance Pulses

Insecticide Group 4 Fungicide Group 4, 7, 12

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Cruiser SFS (PCP# 27696)	Syngenta	Thiamethoxam 47.6%	Liquid suspension	1L, 5 L (Cruiser SFS) + 2 x 1L, 5 L (Apron Maxx)
Apron Maxx RTA (PCP# 27633)		Fludioxonil 0.73% Metalaxyl-M 1.7%		
Vibrance 600FS (PCP # 29038)		Sedaxane 600 g/L		1, 5 L

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Chickpea	Wireworms	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Seed-borne eschscholtzia blight caused by *Ascochyta rabiei* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	125 mL Apron Maxx RTA + 10 mL Vibrance + 50 - 83 mL Cruiser SFS Commercial treaters have the option of substituting 125 mL Apron Maxx RFC for Apron Maxx RTA.

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Crops	Weeds	Rates	Max. no. of kg of a.i./ha
Leek	Wheatworm	Seed rot, pre-emergence and post-emergence damping-off caused by Fusarium spp., Rhizoctonia spp. and Pythium spp. Seed rot and seedling blight caused by seed-borne Alternaria spp. Ear tilting on ascend by Fusarium spp. Seed-borne eschscholtzia blight caused by Mycosphaerella blotchii Seed decay, seedling blight and damping-off caused by Rhizoctonia cerealis	125 mL Spore Wave EW + 0.5 mL Nitrojuice + 50 - 90 mL Crimson Glaze Ultrasonic Pothole (cont'd)
Pre-post seedling root pest	Wheatworm Pea leaf weevil	Seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by Fusarium spp., Rhizoctonia spp. and Pythium spp. Seed-borne eschscholtzia blight and ham rot caused by Mycosphaerella pinodes Seed decay, seedling blight and damping-off caused by Rhizoctonia cerealis	Commercial readers have the option of substituting 125 mL Spore Wave WG for Spore Wave EW.

† Crimson Glaze Pothole provides suppression of pinworm and pea leaf weevil activity. For moderate to heavy infestations use Crimson Glaze Ultrasonic Pothole (cont'd), available only through commercial retailers.

Registered Tank Mixes

None registered.

Application Information

For use in a closed application system, an open-mixing lid of product is permitted. Apply Crimson Glaze Ultrasonic Pothole with ring wood treatment equipment that provides uniform wood coverage. Mixing with viscosifiers may increase drying time.

Wood Treatment and Inoculants: Crimson Glaze Ultrasonic Pothole is compatible with Rhizobium-based inoculants. Check with inoculant manufacturer for application details prior to use.

How to Apply

For control of the listed chewing and sucking pests, as well as wood blooms and soil borne diseases of registered crops, use 125 mL of Spore Wave EW + 0.5 mL of Nitrojuice 500 EC + 50 – 90 mL of Crimson Glaze Ultrasonic Pothole (cont'd) per 100 kg of seed.

How It Works

Crimson Glaze Ultrasonic Pothole controls pea leaf weevil, wireworms and other listed insects through contact and systemic activity of clothianidin. Thiabendazole is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases. Sedaxane is an SDHI fungicide with systemic properties.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 44 days after planting. Treated seed must not be used for food, feed or oil processing.

Environmental Precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Toxic to bees. Bees can be exposed to product residues. Domestic honey, pollen and/or wax should not be used in wood treatment applications. Treated seed is toxic to birds and should not be consumed. Any spilled or unplanted seed must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rabbits) > 5,000 mg/kg.
Ultrasonic 5000 EC: Oral LD_{50} (rats) = 2,171 mg/kg. Dermal LD_{50} (rabbits) > 5,000 mg/kg.

Storage

Humid storage required. Store product in original container, ideally at temperatures below 10 degrees Celsius.

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Cruiser Vibrance Quattro

Application Range & Integrated Biology in 4 + 4L

Formulation

Product	Nutrients	Active ingredients	Concentration	Dosage per Acre
Cruiser Vibrance Quattro 4 FS (CVQ)	Inorganic	Carboxin 37.5 g/L Difenoconazole 18.8 g/L Fludioxonil 18.8 g/L Metalaxyl 12.5 g/L Thiamethoxam 212.5 g/L	Liquid suspension	2 mL / 100 L Water

Crops, Insects and Diseases Controlled/ Rates

Crops	Insects	Diseases Controlled	Nematodes Controlled	Dosage / 100 kg seeds
Barley	Wireworms, Cutworms, Aphids*	Seed and soil - seedling blight, root rot and damping off caused by pythium and rhizoctonia species, Covered smut, Loose smut, Stripe disease Seedling blight, root rot and damping off caused by pythium and fusarium species, Leaf scorch, Net blotch, Leaf spot	Suppress root rot nematodes (spp.), Suppress cereal cyst nematode (spp.)	200 mL
Wheat, spring	Wireworms, Cutworms, Aphids*	Seed and soil - seedling blight, root rot and damping off caused by pythium and rhizoctonia species, Covered smut, Loose smut, Stripe disease Seedling blight, root rot and damping off caused by pythium and fusarium species, Common root rot, Leaf spot	Suppress root rot nematodes (spp.), Suppress cereal cyst nematode (spp.)	
Wheat, winter	Wireworms, Cutworms, Aphids*	Seed and soil - seedling blight, root rot and damping off caused by pythium and rhizoctonia species, Covered smut, Loose smut, Stripe disease Seedling blight, root rot and damping off caused by pythium and fusarium species, Common root rot, Net blotch, Leaf spot	Suppress root rot nematodes (spp.), Suppress cereal cyst nematode (spp.)	
Oats	Wireworms	Seed and soil - seedling blight, root rot and damping off caused by pythium and rhizoctonia species, Covered smut, Loose smut, Stripe disease Seedling blight, root rot and damping off caused by pythium and fusarium species, Leaf scorch, Net blotch, Leaf spot	Suppress root rot nematodes (spp.)	200 mL

Note

- For control of foliage eating insects, an Insecticide with Group 3A Active Ingredient is to be used as per the label of the Insecticide.
- Seeds are not to be consumed or used for feeding purposes.
- Treated seeds are not to be used for sowing, Grazing, Silage, Processing, Feeding and Harvesting.
- Treated seeds are not to be used for oil extraction.

Registered Seed Rates

Wheat, Barley, Oats, Triticale, Durum Wheat: 100 kg seed

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Gaucho CS FL/Gaucho 480 FL/Gumdrops 600 FS (cont'd)

Crops	Insects controlled	Diseases controlled	Rate
Gumdrops 600 FS			
Canola, mustard, rapeseed	Early season control of flea beetle		88.7 - 1,333 mL per 100 kg of seed
Field corn, field corn for seed production	Early season control of wireworms		21.3 mL per 80,000 seeds

Note: In areas where flea beetle populations are high, use the higher rates.

Registered Tank Mixes

For areas where flea beetle populations are high, tank mix Gaucho CS FL seed treatment with Gaucho 480 FL.

Application Information

For use in commercial seed treatment facilities only. Treated canola, rapeseed or mustard (condiment and oilseed types) seed stored for periods in excess of 9 months may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 9 months should be tested for germination before planting.

How It Works

Gaucho CS FL is a systemic insecticide and fungicide seed treatment. The insecticide imidacloprid is for early season protection from flea beetles. Gaucho CS FL seed treatment contains the fungicides carbathiin and thiram. These fungicides control seed rot, damping off, seedling blight and early season rust rot caused by *Pythium, Rhizoctonia* and *Fusarium* on canola, rapeseed and mustard (condiment and oilseed types); also controls seed-borne blackleg of canola and rapeseed.

Restrictions

Do not use treated seed for food, feed or oil processing. Do not graze or feed livestock on treated areas for four weeks after planting. Mustard greens grown or harvested from Gaucho CS FL seed treatment-treated seed must not be used for human consumption. **Grazing:** Do not graze or feed livestock on treated areas for four weeks after planting.

Environmental Precautions

Gaucho CS FL is highly toxic to birds and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash waters. Cover or incorporate spilled treated seeds.

Toxicity

Oral LD_{50} (rats) = 3,967 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original containers. Do not store above 35° Celsius.

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Seed Treatment Index

Gemini

Fungicide Group 3, M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Gemini (PCP#27826)	BASF	Triticonazole: 1.25% Thiram: 12.5%	Liquid flowable	6 L, 200 L

Crops, Insects and Diseases Controlled, Rates

Crops	Diseases controlled	Diseases suppressed*	Rates per 100 Kg seed
Barley	Covered smut, false loose smut, true loose smut, *Pythium* damping-off, seed rot and seedling blight caused by seed and soil-borne *Fusarium* spp.	Common root rot and seedling blight caused by *Cochliobolus*, *Fusarium* crown and root rot	360 mL
Oats	Covered smut, loose smut		
Wheat	Common bunt, loose smut, *Pythium* damping off, Seed rot caused by *Fusarium* sp., seedling blights caused by seed and soil-borne *Fusarium* spp.	*Fusarium* crown and root rot, seedling blight and common root rot caused by *Cochliobolus*	

* Suppression means consistent control at a level not optimal but still of commercial benefit.

Bushels Treated

Container size	Barley*	Oats**	Wheat***
6 L	75	108	81
200 L drum	2,552	3,602	2,041

* Based on barley at 21.8 kg/bu (40 lbs/bushel), ** based on oats at 15.4 kg/bu (34 lbs/bushel), *** based on wheat at 27.2 kg/bu (60 lbs/bu)

Registered Tank Mixes

None registered.

Application Information

Gemini is a ready-to-use seed treatment formulation for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Gemini can also be used in "On the Go" air seeder treatment systems. When used at the recommended rate of 360 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment/machines.

How it Works

The active ingredients in Gemini are triticonazole and thiram. Triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed- and soil-borne diseases. Thiram is a dithiocarbamate fungicide with contact activity.

Restrictions

Do not use treated seed for food, feed or oil processing.

Environmental Precautions

Gemini is toxic to birds and wildlife. Ensure proper soil incorporation of the seeds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water. Do not contaminate water by cleaning of equipment or disposal of wastes. **Leaching**: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

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Gemini (cont'd)

Toxicity
Oral LD_{50} (rats) = >2,000 mg/kg. Dermal LC_{50} (rats) = >2,000 mg/kg.

Storage
Store in original container. Store in an area away from food, feed stuffs, fertilizers and seed. Protect from freezing.

Helix Vibrance

Insecticide Group 4 Fungicide Group 3, 4, 7, 12

Available to commercial seed treaters only

Formulation

Product	Company	Active ingredient	Formulation	Container size
Helix XTra (PCP# 26638)	Syngenta	Thiamethoxam: 20.7% Difenoconazole: 1.25% Metalaxyl-M: 0.39% Fludioxonil: 0.13%	Liquid suspension	Bulk
Vibrance 500FS (PCP# 30438)		Sedaxane: 500 g/L		
Helix Vibrance (PCP# 31464)		Thiamethoxam: 269 g/L Difenoconazole: 26 g/L Metalaxyl-M and S-isomer: 5 g/L Sedaxane: 3.4 g/L Fludioxonil: 1.7g/L	Suspension	Bulk

Crops, Insects and Diseases Controlled, Rates

Products	Crops	Insects controlled	Diseases controlled	Rate per 100 kg seed
Helix Xtra	Canola, oriental mustard (oil seed[1] and condiment type)	Early season control of flea beetle: (28 - 35 days)	Seed-borne blackleg, seed-borne alternaria and the seedling disease complex (damping-off, seedling blight, seed rot and root rot) caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	1.5 L
Vibrance 500FS	Canola		Seed decay, seedling blight and damping off caused by *Rhizoctonia solani*	5 - 10 mL
Helix Vibrance	Canola, rapeseed and mustard (condiment and oilseed)	Flea beetles	Seed-borne blackleg (*Leptosphaeria maculans*), seed-borne alternaria (*Alternaria* spp), seedling disease complex (damping-off, seedling blight, seedling blight seed rot and root rot) caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	1.5 L

Note: Helix Vibrance is only available as a co-pack of Helix Xtra and Vibrance 500FS.

[1] Registered under User Requested Minor Use Label Expansion program

Application Information
For use in commercial seed treatment facilities with closed transfer systems only. All seed treated with this product must be conspicuously coloured at the time of treatment. Consult the manufacturer of the seed treating equipment for advice on the operation and calibration of the equipment. Allow the seed to dry before bagging.

How it Works
Helix Vibrance seed treatment contains an insecticide (thiamethoxam) and five fungicides (difenoconazole, metalaxyl-M and S-isomer, fludioxonil and sedaxane). The insecticide provides early season control of flea beetles (28 - 35 days). The fungicide component provides early season control of seed-borne diseases and seedling diseases.

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Restrictions
Treated seed must not be used for food, feed or oil processing.

Environmental Precautions
Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. If treated seed is spilled outdoors, promptly clean up.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Heated storage required. Helix Vibrance treated canola and mustard can be stored for 18 months without loss in germination or insect and disease performance.

Insure Cereal

Fungicide Group 3, 4, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Insure Cereal (PCP# 30685)	BASF	Pyraclostrobin: 17 g/L Triticonazole: 17 g/L Metalaxyl: 10 g/L	Liquid flowable	9.8 L, 450 L

Crops, Insects and Diseases Controlled, Rates

Crops	Diseases controlled	Diseases suppressed[1]	Rates per 100 Kg seed
Barley, oats, rye, triticale and wheat (all types)	Seed rot/pre-emergence damping-off caused by *Fusarium* spp., *Cochliobolus sativus*, and *Pythium* spp. Post-emergence damping-off caused by *Pythium* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Root rot caused by *Fusarium* spp. and *Pythium* spp. Loose smut (*Ustilago tritici*) - rye, triticale, wheat Common bunt (*Tilletia tritici*, *T. laves*) - rye, triticale, wheat True loose smut (*Ustilago nuda*) - barley Covered smut (*Ustilago hordei*) - barley False loose smut (*Ustilago nigra*) - barley Loose smut (*Ustilago avenae*) - oat Covered smut (*Ustilago kolleri*) - oat	Seedling blight caused by *Cochliobolus sativus* Root rot caused by *Cochliobolus sativus*	300 ml

[1] Suppression means consistent control at a level not optimal but still of commercial benefit.

Bushels Treated

Container size	Barley*	Oats**	Wheat***
9.8 L	150	212	120
450 L	6900	9700	5500

* Based on barley at 21.8 kg/bu (48 lbs/bushel). ** Based on oats at 15.4 kg/bu (34 lbs/bushel). *** Based on wheat at 27.3 kg/bu (60 lbs/bu)

Registered Tank Mixes
None registered.

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Insure Cereal (cont'd)

Application Information

Insure Cereal is a ready-to-use seed treatment formulation for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist type treatment machines. Insure Cereal can also be used in "On the Go" air seeder treatment systems. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment.

How it Works

The active ingredients in Insure Cereal are pyraclostrobin, triticonazole and metalaxyl. Pyraclostrobin is a strobularin fungicide that provides systemic broad spectrum activity against seed- and soil-borne diseases. Triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed- and soil-borne diseases. Metalaxyl is a phenylamide fungicide with systemic activity against seed and seedling diseases caused by oomycete fungi.

Restrictions

Do not use treated seed for food, feed or oil processing.

Environmental Precautions

Insure Cereal is toxic to birds and wildlife. Ensure proper soil incorporation of the seeds. If treated seed is spilled outdoors, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water. Do not contaminate water by cleaning of equipment or disposal of wastes. **Leaching**: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = >2,000 mg/kg rats. Dermal LC_{50} (rats) = >2,000 mg/kg.

Storage

Store in original container. Store in an area away from food, feed stuffs, fertilizers and seed. Protect from freezing.

INTEGO Solo

Fungicide Group 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
INTEGO Solo (PCP# 31324)	Valent Canada Inc. distributed by Nufarm Agriculture	Ethaboxam: 383g/L	Suspension	3.78 L

Crops, Insects and Diseases Controlled, Rates

Crops	Diseases controlled	Diseases suppressed	Rates per 100 Kg seed
Wheat (all), barley, rye, oats, triticale, millet (pearl, proso), buckwheat	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 17 mL
Corn (sweet, field, pop)	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 19.6 mL
Lentil, field pea*, chickpea, faba bean, dry bean, soybean	Seed rot/pre-emergence damping-off caused by *Pythium* spp.	Early-season root rot caused by *Aphanomyces euteiches* and/or *Phytophthora sojae*	19.6 mL
Canola, rapeseed, Ethiopian mustard (*Brassica carinata*), flax, mustard seed	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 19.6 mL

* Emergency Use Registration.

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Registered Tank Mixes

Tank mix partner	Crop
Nipsit SUITE	Wheat (all)
Apron Advance	Chickpea, lentil, dry pea, dry bean, faba bean, soybean
Apron Maxx RTA	Chickpea, lentil, dry pea, dry bean, faba bean, soybean
Cruiser Maxx Vibrance Beans	Soybean, dry bean
Cruiser Maxx Pulses	Dry pea, lentil, chickpea
Vibrance Maxx RTA	Peas, lentils, chickpea
VitaFlo 280	Wheat, barley, oat, rye, triticale, dry bean, corn (field, sweet), flax, lentil, pea, soybean

Application Information

INTEGO Solo does not contain a colourant; any seed treated with INTEGO Solo must be conspicuously coloured. Ensure INTEGO Solo is thoroughly mixed with tank-mix partner. INTEGO Solo does not control *fusarium* spp. INTEGO Solo should be tank mixed with an appropriate partner to provide *fusarium* spp. control.

How it Works

INTEGO Solo contains ethaboxam. Its mode of action is to inhibit cell division.

Restrictions

Grazing: Do not graze soybean or field pea fields grown from treated seeds or feed soybean forage or hay from such fields to livestock. Do not use treated seed for feed, food or oil processing.

Environmental Precautions

Toxic to aquatic organisms.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 5,000 mg/kg.

Storage

Store this product away from feed or food. Store in a cool place. Do not allow this product to freeze.

Lumiderm

Insecticide Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lumiderm (PCP# 30894)	E.I. duPont Canada	Cyantraniliprole: 625 g/L	Flowable suspension	Bulk

Crops, Insects Controlled and Rates

Crop	Insects controlled	Rate per 100 kg of seed	Specific comments
Canola Rapeseed Oilseed mustard	Flea beetles	960 - 1600 mL	The application rates for flea beetles will also provide early season protection from cutworm feeding damage. Use higher rates in areas with high pest pressure or where extended early season control is required.
	Cutworms	480 - 960 mL	

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Lumiderm (cont'd)

Registered Tank Mixes
Lumiderm can be tank mixed with Prosper EverGol or Helix Vibrance seed treatments.

Application Information
For use in closed treatment systems at commercial seed treatment facilities only.

Application Tips
Regulations pertaining to the *Seeds Act* must be strictly adhered to when using this product. Seed must be conspicuously coloured at the time of treatment. Dilute in sufficient volume to obtain thorough, uniform coverage.

How it Works
Lumiderm is a flowable suspension that is applied as a seed treatment for early season protection from flea beetle feeding damage for 28 to 35 days and early season protection from cutworm feeding damage.

Restrictions
Do not make a subsequent foliar application of any Group 28 insecticide for a minimum of 60 days after planting seed treated with Lumiderm seed treatment. See the Lumiderm label for labelling requirements for all bags containing treated seed .

Environmental Precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by the cleaning of equipment or disposal of wastes.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg. Toxic to aquatic organisms. Toxic to bees. When this product is applied and used according to label directions, the risk to bees is expected to be negligible.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed. Do not freeze.

Maxim D/Maxim MZ PSP

Fungicide Group Maxim D 3,12; Maxim MZ PSP 12, M3*

Formulation

Product	Company	Active ingredient	Formulation	Container size
Maxim D (PCP# 30599)	Syngenta	Fludioxonil: 19.4 g/L Difenoconazole: 19.4 g/L	Liquid suspension	9.2 L
Maxim MZ PSP (PCP# 27965)		Fludioxonil: 0.5% Mancozeb: 5.7%	Dry powder	10 kg

Crops, Diseases Controlled and Rates

Crops	Diseases	Rate per 100 kg seed
Potato (seed piece treatment)	Black scurf including stem and stolon canker (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.).	130 mL of Maxim D 500 grams of Maxim MZ PSP

Registered Tank Mixes
None registered.

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Application Information
Apply using equipment that ensures uniform and thorough coverage of each seed piece. Cut pieces should be treated immediately after cutting. Treated seed pieces should be planted in soil above 7° C with adequate soil moisture required for planting. If cut seed needs to be stored or held for a few days, make sure there is adequate cool air (15.5° C) ventilation through the pile of cut seed potatoes at relative humidity of 85 - 90%. Cut and treated seed should not be piled above 1.8 m in height.

How it Works
Fludioxonil is a phenylpyrrole chemistry that possesses contact and local penetrant properties. Mancozeb is a dithiocarbamate fungicide with contact activity.

Restrictions
Do not use treated seed pieces for food or feed purposes.

Environmental Precautions
Maxim D/Maxim MZ PSP is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water by cleaning of equipment or disposal of equipment wash waters.

Toxicity
Oral LD_{50} (rats) = > 5,050 mg/kg. Dermal LD_{50} (rabbit) = > 2,500 mg/kg.

Storage
Heated, dry storage required.

Mertect SC

Fungicide Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Mertect SC (PCP# 13870)	Syngenta	Thiabendazole 500 g/L	Water dispersible suspension	5 L

Crops, Diseases Controlled and Rates

Crops	Diseases	Rate
Potatoes (post-harvest)	Post harvest control of storage rots caused by Fusarium spp., Phoma spp., Helminthosporium spp., Botrytis spp., and Rhizoctonia spp.	1.5 L of Mertect SC per 150 L of water. Spray 2 L of this suspension per 1,000 kg of potato tubers.

Application Information
Shake well before using. Potatoes must rotate along the conveyor line into storage to ensure complete coverage.

Restrictions
Grazing: Do not feed or allow livestock to graze on treated crops. **Re-entry**: Do not enter or allow worker entry into treated areas during the restricted entry interval of 12 hours.

Environmental Precautions
Mertect SC is toxic to aquatic organisms. Do not allow effluent or runoff containing this product to enter lakes, streams, ponds or other waters. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

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Mechanism of Action

Toxicity

Oral LD_{50} (rats) > > 5,000 mg/kg. Dermal LD_{50} (rabbits) > >2,000 mg/kg.

Storage

Store in a dry place.

Nipsit SUITE Cereals OF Seed Protectant

Insecticide Group 4 Fungicide Group 3, 9

Formulation

Product	Company	Active Ingredient	Formulation	Common Size
Nipsit SUITE Cereals OF Seed Protectant (PDP# 31363)	Valent Canada Inc. distributed by Nufarm Agriculture	Clothianidin 30.7 g/L Metconazole 4.62 g/L Metalaxyl 5.54 g/L	Suspension	10L, 110L

Crops, Insects and Diseases Controlled, Rates

Crops	Insects controlled	Diseases controlled	Rate per 100 kg of seed
Wheat	Wireworms* (suppression)	Early season seed rot, pre-emergence damping-off caused by *Fusarium* spp. and *Rhizoctonia solani*. Early season seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight and seedling root rot caused by *Pythium* spp. Common root rot caused by *Cochliobolus sativus* (suppression), common bunt (*Tilletia tritici*), loose smut (*Ustilago nuda*).	125 mL

* Under moderate to high wireworm pressure or in situations where control is required, additional Nipsit INSIDE insecticide may be tank-mixed at rates of 17 - 83 mL per 100 kg of seed.

Registered Tank Mixes

Nipsit INSIDE: 17 - 83 mL/100kg seed. INTEGO Solo: 17 - 17 mL/100kg seed.

Application Information

This product is formulated for use on farm or as a commercial seed treatment product. Do not make any subsequent application of a Group 4 insecticide (i.e. in-furrow, foliar) after treatment with Nipsit SUITE Cereals OF Seed Protectant.

How it Works

Clothianidin is a systemic chloronicotinyl insecticide that results in suppression of wireworm feeding. The fungicides metalaxyl and metconazole provide early season protection against seed and soil borne diseases.

Environmental Precautions

Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar as a result of seed treatments. Treated seed is toxic to birds and small mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface. This product is toxic to aquatic organisms. This product demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable and/or the water table depth is shallow.

Restrictions

Do not use treated seed for food, feed or oil processing. Do not graze or feed to livestock on treated areas for 4 weeks after planting.

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Solubility
[illegible] mg/kg, [illegible] mg/kg

Storage
Store in a cool place. Protect from freezing temperatures.

Poncho 600 FS/Nipsit INSIDE 600 Insecticide

[illegible] Insecticide (Group 4)

Formulations

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Crops, Insects Controlled and Rates
[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
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Registered Tank Mixes

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	

Note: When tank mixing, use tested insecticide systems only.

[illegible]

[illegible] Purchase the product edition of [illegible] Protection. [illegible] Buy it or find at [illegible]

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Proceed

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Step 3 Study:
Research material Treatment and Processes on the work assessment for processing, handling, Cost rate, and Work assessment Work Instruction

Restrictions:
Handling: Do not use in hazard type or as in Design, coffee, Design, temperature, Work Instruction. Do not attempt to use with Work Shop, Safety, and use in Work Shop, Safety, Work Instruction

Environmental Precautions:
Research in use in the use and Work Instruction requirement. Do not apply the product Work in a good Material, Material or Safety Material. Do not contaminate Instruction in Work in Use Applies in a specific Material, Work Handling Instruction in Disposing of Waste. Use Material in Instruction Work Use of Instruction Work Use and in Handling

Toxicity:
Acute LC_{50} (rats): > 10,000 mg/kg; Acute LD_{50} (rats): > 10,000 mg/kg

Storage:
Product Storage Instruction: Work product in Instruction Instruction

Processes Overview

Recommendations:

Design — Work Instruction	Work Instruction	Instruction, Work Instruction, Work Instruction, Work Instruction, Work Instruction	Instruction	Work Instruction, Work Instruction

Design, Instruction, and Work Instruction Considerations:

Design, Instruction, Work Instruction, Work Instruction	Work Instruction	Work Instruction, Work Instruction, Work Instruction,

[illegible] [illegible]

Environmental Precautions

[illegible]

Restrictions

[illegible]

Training

[illegible]

Storage

[illegible]

Exposure Apps

[illegible]

Personal Safety

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Engg. Measures / Control Mod. and Others

[illegible]	[illegible]	[illegible]	[illegible]
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Rancona 6IS (cont'd)

Application Information
Rancona IS is a ready-to-use formulation designed for on-farm and commercial treating. Commercial facilities must use closed mix/load equipment. Rancona Apex can be applied with mechanical, slurry or auger-type seed treating equipment.

Application Tips
Uniform application to seed is necessary to ensure disease protection.

Restrictions
Grazing: Do not graze or feed livestock on areas treated with Rancona IS for 28 days after planting. Do not use seed that has been treated for food, feed or oil processing.

Environmental Precautions
Seed that has been treated with Rancona IS is toxic to birds and small animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store this product away from food or feed. Do not allow this product to freeze.

Raxil MD

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil MD (PMRA 27000)	Bayer CropScience	Tebuconazole 5.0 g/L Metalaxyl 5.0 g/L	Micro-dispersion	10 L, 200 L, 1000 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seeds	Hectares treated per 10 L jug
Wheat	Loose smut, common bunt or stinking smut, seed rot and pre-emergent damping off caused by seed- and soil-borne *Fusarium* spp., seedling blight caused by seed-borne *Fusarium* spp., damping off caused by *Pythium* spp., seed-borne *Septoria nodorum*	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seed rot and pre-emergent damping off caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL	133[1]
Barley	True loose smut, covered smut, false loose smut, seed rot and pre-emergent damping off caused by seed- and soil-borne *Fusarium* spp., seedling blight caused by seed-borne *Fusarium* spp., damping off caused by *Pythium* spp., barley leaf stripe	Root and crown rot caused by seed- and soil-borne *Fusarium* spp. common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seed rot and pre-emergent damping off caused by seed- and soil-borne *Cochliobolus sativus*,seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL	15.2[1,2]

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Back to Seed Treatment Index

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seeds	Bushels treated per 10 L jug
Oats	Covered smut, loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., seedling blight caused by seed-borne *Fusarium* spp., damping-off caused by *Pythium* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp. common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL	216***

* Based on wheat at 21.3 kg/bu (60 lbs/bu), ** based on barley at 21.6 kg/bu (40 lbs/bushel), *** based on oats at 15.4 kg/bu (24 lbs/bushel)

Application Information
Raxil MD is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber.

How it Works
Raxil MD is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.

Restrictions
Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use for food, feed or oil processing.

Environmental Precautions
The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not expose treated seeds on the soil surface. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 5,050 mg/kg. Dermal LD_{50} (rabbit) = > 5,050 mg/kg.

Storage
Store product in original container only. Store in a cool, dry place and avoid excessive heat.

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Raxil PRO

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil PRO (PCP# 30102)	Bayer CropScience	Tebuconazole: 3.0 g/L Prothioconazole: 15.4 g/L Metalaxyl: 6.2 g/L	Micro-dispersion	10 L, 58.5 L, 175.5 L, 1000 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seeds	Bushels treated per 10 L jug
Wheat	Loose smut, common bunt or stinking smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	113*
Barley	True loose smut, covered smut, false loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. barley leaf stripe	Root and crown rot caused by seed- and soil-borne *Fusarium* spp common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	141**
Oats	Covered smut, loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. Seedling blight caused by seed-borne Fusarium spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	200***

* Based on wheat at 27.3 kg/bu (60 lbs/bu), ** based on barley at 21.8 kg/bu (48 lbs/bushel), *** based on oats at 15.4 kg/bu (34 lbs/bushel)

Registered Tank Mixes

Raxil Pro may be combined with Stress Shield for control of certain insect pests in wheat, barley and oats.

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Application Information
Raxil Pro is a ready-to-use formulation designed for commercial or on-farm treating with conventional seed treating equipment. Uniform application to seed is necessary to ensure optimum product performance.

How it Works
Raxil Pro is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.

Restrictions
Do not use treated seed for food, feed or oil processing.

Environmental Precautions
The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not expose treated seeds on the soil surface. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only. Store in a cool, dry place and avoid excessive heat.

Raxil Pro Shield Seed Treatment

Insecticide Group 4 Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil Pro (PCP# 30102)	Bayer CropScience	Tebuconazole: 3 g/L Prothioconazole: 15.4 g/L Metalaxyl: 6.2 g/L	Micro-dispersion	10 L
Stress Shield 600 (PCP# 30668)		Imidacloprid: 600 g/L		1.5 L

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Wheat	Wireworm: early season protection against crop stand injury	**Controlled**: Loose smut, common bunt or stinking smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. **Suppression**: Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL

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Raxil Pro Shield Seed Treatment (cont'd)

Crops	Insects	Diseases	Rate per 100 kg of seed
Barley	Wireworm: early season protection against crop stand injury	**Controlled**: True loose smut, covered smut, false loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. barley leaf stripe **Suppression**: Root and crown rot caused by seed- and soil-borne *Fusarium* spp common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL
Oats	Wireworm: early season protection against crop stand injury	**Controlled**: Covered smut, loose smut seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. **Suppression**: Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL

Registered Tank Mixes

None registered.

Application Information

How to apply: Pour container of Stress Shield into Raxil Pro container and mix thoroughly. Raxil Pro Shield can be used in commercial and on-farm seed treatment equipment that can accurately control application rate and provide good coverage of treated seed.

Application Tips

Uniform application to seed is necessary to ensure seed safety and best protection against disease and insects.

How it Works

Raxil Pro Shield contains a systemic fungicide that provides control of seed and seedling diseases. Raxil Pro Shield also contains a systemic insecticide that provides protection from damage caused by chewing and sucking insects through contact and systemic activity.

Restrictions

Treated seed must not be used for food, feed or oil processing. **Grazing**: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Environmental Precautions

The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. Toxic to birds and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Cover or incorporate spilled treated seeds.

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Toxicity

Raxil Pro: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.
Stress Shield: Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg

Storage

Do not store in direct sunlight. Do not store above 35° C. Store product in original container.

Raxil T

Fungicide Group 3, M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil T (PCP# 27566)	Bayer CropScience	Tebuconazole: 6.7 g/L Thiram: 222 g/L	Suspension	10 L, 200 L, 1000 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Wheat	Seed rot caused by seed- and soil-borne *Fusarium*, seedling blight caused by seed-borne *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*, seed rot caused by saprophytic fungi *Penicillium*, *Aspergillus* and *Alternaria*, seed-borne *Septoria*, common bunt, loose smut, *Pythium* seed rot	*Fusarium* root rot and *Fusarium* crown rot, common root rot caused by *Cochliobolus sativus*	225 mL
Barley	Seed rot caused by seed- and soil-borne *Fusarium*, seedling blight caused by seedborne *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*, seed rot caused by saprophytic fungi *Penicillium*, *Aspergillus* and *Alternaria*, false loose smut, covered smut, loose smut, *Pythium* seed rot	*Fusarium* root and crown rot, common root rot caused by *Cochliobolus sativus*	225 mL
Oats	Seed rot caused by seed- and soil-borne *Fusarium*, seedling blight caused by seedborne *Fusarium*, seed rot and seedling blight caused by *Cochliobolus sativus*, loose smut, *Pythium* seed rot	Common root rot caused by *Cochliobolus sativus*	225 mL

Application Information

Raxil T is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment. Seed is protected by Raxil T as soon as it is treated, and seed may be planted immediately. Germination will not be affected by treatment as long as over application does not occur and seed is properly stored.

Application Tips

Uniform coverage at the correct rate is important for satisfactory results.

How it Works

Raxil is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Environmental Precautions

Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting. Do not contaminate ponds, lakes or streams.

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Raxil T (cont'd)

Toxicity
Oral LD_{50} (rats) = 1,951 mg/kg. Dermal LD_{50} (rabbit) = > 2,020 mg/kg.

Storage
Store product in original container. Store product in a cool, dry place and avoid excessive heat.

Raxil WW Seed Treatment

Insecticide Group 4 Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil MD (PCP# 29280	Bayer CropScience	Tebuconazole: 5 g/L Metalaxyl: 6.6 g/L	Suspension	10 L + 2.1 L 80 L + 16.8 L
Stress Shield (PCP# 29609)		Imidacloprid: 480 g/L		

Crops, Insects and Diseases Controlled, Rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Wheat	Wireworm: early season protection against crop stand injury	**Controlled:** Loose smut, common bunt, seed rot and pre-emergent damping-off caused by seed and soil borne *Fusarium* spp., damping off caused caused by *Pythium* spp, seed borne *Septoria nordum* **Suppression:** Root and crown rot caused by seed and soil borne *Fusarium* spp., common root rot caused by seed and soil borne *Cochliobolus sativus*, seed rot and pre-emergent damping off caused by seed and soil borne *Cochliobolus sativus* and seedling blight caused by seed borne *Cochliobolus sativus*	Raxil MD: 300 mL Stress Shield: 63 mL
Barley	Wireworm: early season protection against crop stand injury	**Controlled:** True loose smut, covered smut., false loose smut, seed rot and pre-emergent damping-off caused by seed and soil borne *Fusarium* spp., damping off caused caused by *Pythium* spp, and barley leaf stripe **Suppression:** Root and crown rot caused by seed and soil borne *Fusarium* spp., common root rot caused by seed and soil borne *Cochliobolus sativus*, seed rot and pre-emergent damping off caused by seed and soil borne *Cochliobolus sativus* and seedling blight caused by seed borne *Cochliobolus sativus*	Raxil MD: 300 mL Stress Shield: 63 mL
Oats	Wireworm: early season protection against crop stand injury	**Controlled:** Covered smut, loose smut, seed rot and pre-emergent damping-off caused by seed and soil borne *Fusarium* spp., damping off caused caused by *Pythium* spp. **Suppression:** Root and crown rot caused by seed and soil borne *Fusarium* spp., common root rot caused by seed and soil borne *Cochliobolus sativus*, seed rot and pre-emergent damping off caused by seed and soil borne *Cochliobolus sativus*, seedling blight caused by seed borne *Cochliobolus sativus*	Raxil MD: 300 mL Stress Shield: 63 mL

Registered Tank Mixes:
None registered.

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Application Information

How to apply: Pour container of Storm Shield into Rancona MD container and mix thoroughly. Rancona WW can be used in commercial and on-farm seed treatment equipment that can accurately control application rate and provide good coverage of treated seed.

Application Tips

Uniform application to seed is necessary to ensure seed safety and best protection against diseases and insects.

How it Works

Rancona WW contains a systemic fungicide that provides control of seed and seedling diseases. Rancona WW also contains a systemic insecticide that provides protection from damage caused by chewing and sucking insects through contact and systemic activity.

Restrictions

Treated seed must not be used for food, feed or oil processing.

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Environmental Precautions

Toxic to birds and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Cover or incorporate spilled treated seeds.

Toxicity

Oral LD_{50} (male/female rats) = 3,067 mg/kg.

Storage

Do not store in direct sunlight. Store in a cool, dry place and avoid excessive heat.

Senator PSP

Fungicide Group 1

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Senator PSP (PCP# 14688)	Nippon Soda Company	Thiophanate-methyl 10%	Dust	10 kg

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Rate per 100 kg of cut seed
Potato	Verticillium wilt, Fusarium rot, silver scurf (*Helminthosporium solani*), and aids in control of seed piece decay and black leg infections	500 g

Application Information

Apply in a concrete container or by dust attachment over belt. Cut pieces should be treated within 4 hours of cutting. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 – 3 days in open crates before bagging.

Application Tips

Senator PSP contains no colourant. An appropriate colourant must be added when this product is applied. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. Reduced control can be expected in fields where volunteers from the previous year's crop act as a source of infection.

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Environmental Precautions

By-products from this product are toxic to aquatic organisms. Do not contaminate any body of water or groundwater when disposing of equipment washwater.

Toxicity

Oral LD_{50} (rats) > > 5,000 mg/kg

Storage

Store in a dry place.

Stress Shield 600

Formulation

Product	Company	Active Ingredient	Formulation	Container Size
Stress Shield 600 (FSP# 49585)	Bayer CropScience	imidacloprid 600 g/l	Suspension	2 L

Crops, Insects Controlled and Rates

Crops	Insects controlled	Rate per 100 kg seed	Specific comments
Wheat (durum, spring and winter) Barley Oats	Wireworm	17 - 50 mL	Dose in sufficient liquid to achieve uniform distribution on the seed. When rate ranges are given, use the higher rate when insect pressure is expected to be high.
Bean (includes field bean (dry and coloured))	Potato leafhopper Wireworm	138	
Soybeans	Soybean aphid Bean leaf beetle Seedcorn maggot Wireworm	138-208	Use higher rate for early seeding when insect populations are expected to be high or extended control for aphids.
Field peas	Pea leaf weevil	138 - 208	
	Wireworm	138	
Fababeans	Pea leaf weevil Wireworm	138	
Chickpeas Lentils	Wireworm	138	

Registered Tank Mixes

Wheat, barley and oats: For control of certain seed and soil-borne pathogens in wheat, barley and oat seeds and seedlings, Stress Shield 600 may be mixed with Rancona® 2, Rancona® 2 Ultra or EverGol Energy. Follow all appropriate directions and precautions as specified on the fungicide labels.

Legumes: For control of certain seed and soil-borne pathogens in legume seeds and seedlings, Stress Shield 600 may be mixed with the following seed treatment fungicides: Vitavax 45, Vitavax 45 Concentrate, Vitavax 75, Allegiance, EverGol Energy, EverGol Opti®, Apron Maxx RFC and Apron Maxx RTA. Follow all appropriate directions and precautions as specified on the fungicide labels. Ensure the specific legume crop to be treated is registered on the fungicide partner label as well.

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Application Information

For use in commercial and on-farm wood treatment equipment. Mix thoroughly before use or use solely undiluted at one time. All wood must be completely saturated at the time of treatment. Good wood work hence Shield 600 may reduce wood flow in the wood drill. Recalibration of the wood drill may be required to obtain correct recycling rate for best planning. Green Shield 600 can be used as an in-vat treatment. Prior to wet dipping applications, Green Shield must be thoroughly agitated to ensure uniform mixing of the product. Dip in the manufacturer's recommended time. Dip at the high above 20 °C prior to wet dipping application. Do not apply direct heat to materials.

Dos & Shells

Green Shield 600 is a co-biocide wood treatment insecticide that also also preserves the cutaway edge from damage caused by insect chewing and sucking insects through contact and ingestion activity.

Environmental Precautions

Toxic to birds and aquatic organisms. Any spilled or exposed work area be decontaminated into the soil or otherwise cleaned up from the soil surface. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of matter.

Restrictions

Do not use treated wood for food, food or oil processing. **Grazing** Do not graze or feed to stock on treated area for four weeks after planting.

Toxicity

Oral LD$_{50}$ (rats) > 1 - 100 -> 2,000 mg/kg. Dermal LD$_{50}$ (rats) > 1 2,000 mg/kg

Storage

Store in a cool, dry place out of direct sunlight. Do not store above 40 C.

Thiram 75 WP

Fungicide Group M

Formulation

Product	Contents	Active Ingredient	Presentation	Container size
Thiram 75 WP 250 g/kg (75%)	Thiram 75%	Thiram 75%	Wettable powder	1 kg, 5 kg

Crops, Diseases Controlled and Rates

Crops	Diseases Controlled	Rate per 100 L of water
Alfalfa	Anthracnose spot	75 g
Dry beans, snap beans, peas, soybean	Seed decay, seedling blight and damping-off	75 - 75 g
Field corn	Seed decay, seedling blight and damping-off	75 g
Grasses	Seed decay, seedling blight and damping-off	75 g
Mixed legumes	Seed rots, damping-off and seedling blights	75 g
Safflower	Seed decay, damping-off, seedling blight and root rot	75 g
Sweet corn	Seed decay, damping-off, seedling blight and root rot	75 g
Sugar beet	Seed decay, damping-off, seedling blight and root rot	75 g

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Titan® 10 WP Insect ®

Application Information

For the following crops, please Titan® 10 WP to make up Additional Water, and apply with recommended ground equipment.

Titan® 10 WP	Rate of Water	Spray Concentration
Apples		
1 lb	100 gal	1 lb
2 lb	100 gal	2 lb
3 lb	100 gal	3 lb
Ornamentals		
1 lb	1 - 3 gal	1 lb
2 lb	1 - 3 gal	2 lb
3 lb	1 - 3 gal	3 lb

Area It Works

Titan® is a protective fungicide applied as a residual protectant product.

Restrictions

Grazing: Do not graze treated plots or feed clippings from treated crops to livestock.

Environmental Precautions

Treated seed may be harmful to birds if ingested. Do not contaminate any body of water.

Toxicity

Acute LD$_{50}$ more dilute > 5lb - do not apply.

Storage

Store in a cool, dry, ventilated place away from food and feed. Keep away from fire and sparks.

Titan Emesto

Type of Pest	Titan® 10 WP Rate	Titan® 10 WP Rate
Aphids	1 lb	2 lb
Caterpillars	1 lb	2 lb
Leafhoppers	1 lb	2 lb
Mites	1 lb	2 lb
Thrips	1 lb	2 lb

Formulation

Crop(s)	Pest(s)	Rate per Application	Application	Restrictions
Apples, Pears, Stone Fruits	Powdery Mildew	1 lb/100 gal 2 lb/100 gal 3 lb/100 gal	Foliar	7 day PHI Do not graze treated crops
Ornamentals	Powdery Mildew	1 lb/100 gal 2 lb/100 gal 3 lb/100 gal	Foliar	7 day PHI Do not graze treated crops

Crops, Insects, and Diseases Controlled and Rate

Crop	Diseases Controlled	Rate per Application	Notes
Apples	Powdery mildew, scab, rust, leaf spot, anthracnose, apple scab, Alternaria leaf spot, black rot, powdery mildew on apple, Botrytis blight, fruit rot, sooty blotch, flyspeck	1 lb/100 gal, 2 lb/100 gal, 3 lb/100 gal	Do not graze treated crops. Do not feed to livestock.

Registered Pests (Main)
Aphids, suppression

Application Information
For optimum results, add warm (~water) to the required amount of product and mix thoroughly before adding to the spray tank. Maintain agitation during mixing and application. Do not apply when rain is expected within 24 hours.

Crop & Weeds
Suitable for use in many crops including cereals, oilseeds, potatoes, sugar beet, vegetables, fruit and ornamentals. Always check the label for specific crop recommendations and any restrictions before use.

Environmental Precautions
Do not apply directly to water, or to areas where surface water is present or likely to be present. Avoid contamination of ponds, waterways and ditches with chemical or used containers. Do not apply when rain is forecast within 24 hours.

Toxicity
Harmful to bees. Avoid application when bees are foraging. Do not apply to flowering crops or weeds if bees are present.

Storage
Store in a cool, dry, well-ventilated area away from direct sunlight and heat sources. Keep away from food, drink and animal feedingstuffs. Store in the original container with the lid tightly closed.

Tilkan ST

Active Ingredient

Formulation

Type	Concentration	Physical Form	Container Size
Water Dispersible Granule	75% w/w	Granules	5 kg, 10 kg

Dosage, Timing & Restrictions

Crop	Target Pests	Dosage & Timing	Notes & Restrictions
Cereals (Winter Wheat, Spring Barley)	Aphids, Cereal Leaf Beetle	20 g/ha; apply at first signs of infestation	Do not apply more than once per season. Do not apply to crops under stress from drought, waterlogging or frost. Allow a minimum of 7 days between application and harvest.
Oilseed Rape	Pollen Beetle, Cabbage Stem Flea Beetle, Aphids	20 g/ha; apply at first signs of infestation	Do not apply more than once per season. Do not apply to crops under stress from drought, waterlogging or frost. Allow a minimum of 7 days between application and harvest. Avoid application when bees are foraging.

Spray volume: 200–400 L/ha using conventional equipment.

Application Information
Mix in a clean, half-filled spray tank with agitation running. Add the required amount of product and mix thoroughly before filling the tank to the final volume. Maintain agitation during application.

Application Rate
20 g/ha in 200–400 L/ha water. Use the lower volume in dry conditions and the higher volume in humid conditions or when crop cover is dense.

Crop & Weeds
Suitable for use in cereals, oilseed rape, potatoes, sugar beet and vegetables. Do not apply to crops under stress from drought, waterlogging or frost. Always check the label for specific crop recommendations and any restrictions before use.

Environment

Environmental Precautions

Security

Storage

Yellow 4L

Application Information

Compatibility with Accessories Check if it is compatible with the intended accessories. Please refer to the accessories section for details on the supported models.

Environment

Operate in a dry area. Avoid exposure to direct sunlight, rain, moisture, dripping or splashing water, and dust. Keep away from heat sources such as radiators, heaters, stoves, and other heat-generating devices (including amplifiers). Avoid placing near objects with strong magnetic fields. Avoid placing in unstable locations. Place on a stable, flat surface. Ensure adequate ventilation around the device for heat dissipation.

Environmental Precautions

Use in a well-ventilated environment. Regularly clean the device with a soft, dry cloth. Avoid using alcohol, thinners, benzene, or other volatile substances for cleaning. Do not expose the device to high temperatures, such as near heaters or in direct sunlight. Avoid exposure to high humidity and moisture. Do not place the device in damp areas, such as near water sources. Avoid placing the device in environments with significant temperature fluctuations. Do not place the device in dusty environments.

Warning

Risk of fire, shock or injury. Do not expose to rain or moisture. Do not open. Refer servicing to qualified personnel.

Storage

Store the device in a dry, cool place. Keep it out of the reach of children.

Yellow Essential

Technical Specs

Power, Electronics Connectivity and Wireless

Applications and Functions

Ensure compatibility with the intended accessories. Refer to the accessories section for a list of supported models. Use only accessories that are compatible with the device. Using incompatible accessories may cause damage or malfunction.

Compatibility with accessories. Refer to the accessories section for a list of supported models.

Environment

Operate in a dry area. Avoid exposure to direct sunlight, rain, moisture, dripping or splashing water, and dust. Keep away from heat sources such as radiators, heaters, stoves, and other heat-generating devices (including amplifiers). Avoid placing near objects with strong magnetic fields. Avoid placing in unstable locations. Place on a stable, flat surface. Ensure adequate ventilation around the device for heat dissipation.

seed for food, feed or oil processing. **Re-cropping:** Registered crops for Vibrax EverGol as well as canola, mustard, rapeseed, corn, legumes and cereal grains may be re-planted at any time. For all other crops, do not plant back within 30 days of seeding with Vibrax EverGol treated seed.

Environmental Precautions
Vibrax EverGol is toxic to aquatic organisms. Dispose of all excess treated seed. Leftover treated seed may be distributed around the headland or buried away from water sources in accordance with local requirements. **Labelling:** The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sands) and/or depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = 7,000 mg/kg. Dermal LD_{50} (rabbits) = 7,000 mg/kg.

Storage
Store product in original container. Store in a cool, dry place and avoid excessive heat.

Tuberseal PSPT/ Potato ST 16/PSPT 16%/Solan MZ

Fungicide Group 9

Formulations

Product	Company	Active Ingredient	Formulation	Container size
Tuber-Seal 16 (PSPT# 29158)	Wilbur-Ellis Company	Warcoxin 16 %	Suspension	20 kg
Agri-Sol (PSPT# 30158-81)	Loveland Products Canada	Warcoxin 16 %	Suspension	20 kg
Tuberseal (PSPT# 11860)	Nufarm Canada Inc.	Warcoxin 16 %	Suspension	10 kg
Solan MZ (PSPT# 28571)		Warcoxin 16 %	Suspension	20 kg

Crops, Diseases Controlled and Rates

Crop	Disease	Rate per 100 kg seed
Seed and plants	Fusarium seed and plant decay	4.69 g

Registered Tank Mixes
None registered.

Application Information
Potatoes Seed Pieces: Thoroughly coat the surface of whole or cut seed pieces with dust. If treated whole seed is cut, make a second application to protect the cut surfaces. Plant as soon as possible after treating. However, if planting of cut seed is delayed beyond 2 days after treating, seed should be air-dried before bagging or bins piling.

Environmental Precautions
Do not contaminate food or any body of water.

Toxicity
Oral LD_{50} (rats) = > 4,640 mg/kg. Dermal LD_{50} (rabbits) = > 2,000 mg/kg.

Storage
Store product in a cool, dry, ventilated place.

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Vibrance Maxx

Fungicide Group 4, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Apron Maxx RTA (PUP# 29573)	Syngenta	Fludioxonil: 0.73% Mefenoxam: 1.1%	Liquid suspension	2 x 10 L Apron Maxx + 2 x 300 mL Vibrance 119 L = 3.33 L 454 L = 4 x 3.33 L
Vibrance 600FS (PUP# 30938)		Sedaxane: 600 g/L		

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Rate per 100 kg seed
Chickpea	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Seed-borne ascochyta blight caused by *Ascochyta rabiei* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	325 mL (Apron Maxx) + 5 – 10 mL (Vibrance)
Dry bean	Damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seedling blight caused by *Pythium* spp. Anthracnose caused by seed-borne *Colletotrichum* spp. Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	
Lentil	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling root rot caused by *Fusarium* spp. Seed-borne ascochyta blight caused by *Ascochyta lentis* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	
Peas (field and woodland)	Seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed-borne ascochyta blight and foot rot caused by *Ascochyta pinodes* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	325 mL (Apron Maxx) + 5 – 10 mL (Vibrance)
Soybeans	Damping-off and seed rot caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Seedling root rot caused by *Fusarium* spp. Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. Early season root rot caused by *Phytophthora megasperma* var. *sojae* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	
Sunflowers	Seed rot/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	

Registered Tank Mixes

None registered. Vibrance Maxx is a co-pack of Vibrance 600 FS and Apron Maxx RTA.

Application Information

Vibrance Maxx is a ready-to-apply seed treatment for use in commercial seed treatment plants and for on-farm treatment. The equipment must provide uniform coverage on the seed. Allow the seed to dry before bagging, storing or seeding.

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Vibrance Maxx (cont'd)

Seed Treatment and Inoculants
Vibrance Maxx can be used with some *Rhizobium*-based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. With rough coated seed, the addition of water will increase coverage; contact Syngenta for more information.

How it Works
Vibrance Maxx contains three active ingredients. Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases. Sedaxane is an SDHI fungicide with systemic properties.

Restrictions
Grazing: Do not graze or feed livestock on treated areas for 60 days after planting. **Re-cropping**: Do not plant any crop other than soybeans, beans, chickpeas, lentils, lupins, faba beans and peas within 60 days to fields in which treated seeds were planted.

Environmental Precautions
Vibrance Maxx is toxic to aquatic organisms. Any spilled or exposed seeds must be incorporated into the soil or cleaned up from the soil surface.

Toxicity
Apron Maxx RTA: Oral LD_{50} (rats) = 5,050 mg/kg. Dermal: LD_{50} (rabbits) 2,020 mg/kg.
Vibrance 500FS: Oral LD_{50} (rats) = 2,975 mg/kg. Dermal: LD_{50} (rabbits) > 5,050 mg/kg.

Storage
Heated storage required. Do not store Vibrance Maxx above 30°C. Store product in original container.

Vibrance Quattro

Fungicide Group 3, 4, 7, 12

Formulation

Product *	Company	Active ingredient	Formulation	Container size
Vibrance Quattro (PCP#31408)	Syngenta	Difenoconazole: 26.8 g/L Sedaxane: 15.4 g/L Metalaxyl-M: 9.2 g/L Fludioxonil: 7.6 g/L	Liquid suspension	10 L, 115 L, 450 L

Crops and Staging

Crops	Diseases controlled	Diseases suppressed	Rate per 100 Kg seed
Barley	Seed rots caused by *Fusarium, Pythium, Rhizoctonia, Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered smut (*Ustilago hordei*), false loose smut (*Ustilago nigra*), true loose smut (*Ustilago nuda*)	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL

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Crops	Diseases controlled	Diseases suppressed[1]	Rate per 100 Kg seed
Oats	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered smut (*Ustilago hordei*) Loose smut (*Ustilago avenae*)	Common root rot (*Cochliobolus* spp.)	325 mL
Rye	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Dwarf bunt (*Tilletia controversa*)[2]	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Triticale	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Wheat, spring	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Loose smut (*Ustilago tritici*)	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Wheat, winter	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Dwarf bunt (*Tilletia controversa*)[2] Loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL

Note:

[1]Suppression means consistent control at a level that is not optimal but is still of commercial benefit.

[2]Controls both seed- and soil borne common bunt.

Registered Tank Mixes

For protection from various insects on registered crops, Vibrance Quattro may be mixed with Cruiser 5FS Seed Treatment. This tank mix option is only valid for those crops common to the registered labels of Vibrance Quattro and Cruiser 5FS Seed Treatment Insecticide.

Application Information

Vibrance Quattro is for use on-farm and can also be applied by commercial seed treaters (facilities and mobile treaters) using closed system transfer. Apply Vibrance Quattro utilizing seed treatment equipment that provides uniform seed coverage. Depending on seed size, Vibrance Quattro may be applied as a ready-to-apply application or water may be added to form slurry for more uniform coverage. Allow the seed to dry before bagging or storing into bulk containers. Depending on planting equipment, seed treated with Vibrance Quattro may not flow through planting equipment at the same rate as untreated seed. Recalibrate this equipment before planting treated seed.

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Vibrance Quattro (cont'd)

How it Works
Vibrance Quattro is a combination of the fungicides difenoconazole, metalaxyl-M and S-isomer, sedaxane and fludioxonil, which control or suppress certain seed- and/or soil-borne diseases of cereal crops as listed.

Restrictions
Treated seed must not be used for food, feed or oil processing. **Grazing**: Do not graze or feed livestock on treated areas for 45 days after planting. **Re-cropping**: Do not plant any crop other than cereals within 60 days to fields in which seeds treated with Vibrance Quattro were planted.

Environmental Precautions
Toxic to aquatic organisms. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 5,050 mg/kg. Dermal LD_{50} (rats) = > 2,020 mg/kg.

Storage
Heated storage required.

Vibrance XL

Fungicide Group 3, 4, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vibrance XL (PCP# 30437)	Syngenta	Difenoconazole: 66.2 g/L Metalaxyl-M: 16.5 g/L Sedaxane: 13.8 g/L	Liquid suspension	5.54 L
Dividend XL RTA (PCP# 25777) + Vibrance 500FS (PCP# 30438)		Difenoconazole: 3.37% Metalaxyl-M: 0.27% Sedaxane: 500 g/L		115 L (Dividend) + 1.77 L (Vibrance); 450 L (Dividend) + 4 x 1.77 L (Vibrance)

Crops and Staging

Crops	Diseases controlled	Diseases suppressed[3]	Rate per 100 Kg seed
Barley	General seed rots[1] Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., Seed-borne *Septoria*[2], covered smut, false loose smut, true loose smut	Common root rot (*Cochliobolus* spp.) Fusarium crown and foot rot, take-all	180 - 360 mL
Oats	General seed rots[1] Seedling blight, root rot, and damping-off caused by and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., covered smut, loose smut	Common root rot (*Cochliobolus* spp.)	180 - 360 mL
Rye	General seed rots[1] Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., seed-borne *Septoria*[2], common bunt[4], dwarf bunt[4]	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	180 - 360 mL

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Crops	Diseases controlled	Diseases suppressed[3]	Rate per 100 Kg seed
Triticale	General seed rots[1] Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	180 - 360 mL
Wheat, spring	General seed rots[1] Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., common bunt[4], loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	180 - 360 mL
Wheat, winter	General seed rots[1] Seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot, and damping-off caused by soil-borne *Pythium* spp., seed-borne septoria[2], *Septoria* leaf blotch[2,5], common bunt[4], dwarf bunt[4], loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	180 - 360 mL

[1] General seed rots controlled include those caused by saprophytic organisms such as Fusarium, Pythium, Rhizoctonia, Penicillium and Aspergillus.

[2] Use the 360 mL rate for control of this disease.

[3] Suppression means consistent control at a level that is not optimal but is still of commercial benefit.

[4] Controls both seed- and soil-borne bunts (common, dwarf).

[5] Early season foliar disease control for first 4 weeks after planting. For full season control, apply a foliar fungicide according to label directions.

Registered Tank Mixes

For control of various insects on registered crops, Vibrance XL Seed Treatment may be mixed with Cruiser 5FS or 350FS Seed Treatment Insecticide. Mixing must occur in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating and closed treatment equipment only.

Application Information

Vibrance XL Seed Treatment may be applied through commercial or on-farm equipment. Apply utilizing seed treatment equipment that provides uniform seed coverage. Depending on seed size, Vibrance XL Seed Treatment may be applied as a ready-to-apply application or water may be added to form slurry for more uniform coverage. Allow the seed to dry before bagging or storing in bulk containers. Depending on planting equipment, treated seed may not flow through planting equipment at the same rate as untreated seed. Recalibrate planting equipment before planting treated seed.

How it Works

Vibrance XL Seed Treatment is a combination of the fungicides difenoconazole, metalaxyl-M and S-isomer and sedaxane, which control or suppress certain seed- and soil-borne diseases of cereal crops as listed.

Restrictions

Grazing: Do not graze, feed green forage or cut for hay within 45 days of planting. **Re-cropping**: Do not plant any crop other than cereals within 60 days to fields in which treated seeds were planted.

Environmental Precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to freshwater habitats, estuaries or marine habitats. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Toxicity

Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 5,050 mg/kg.

Storage

Store at temperatures above 0°C and below 30°C.

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Vitaflo 280/Vitaflo SP Fungicide/ Loveland Vitaflo

Fungicide Group 7, M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vitaflo 280 (PCP# 11423)	Chemtura Canada	Carbathiin: 15.59% Thiram: 13.25%	Liquid suspension	10 L, 200 L
Vitaflo SP Fungicide (PCP# 30381)	IPCO		Liquid suspension	10 L, 200 L, 1000 L
Loveland Vitaflo (PCP# 30380)	Loveland Canada Products Inc.		Liquid suspension	10 L, 200 L

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Barley*	Covered and true loose smut, false loose smut, leaf stripe, seed rot and seedling blight caused by *Pythium* spp. and *Penicillium* spp., *Aspergillus* spp. and *Alternaria*	Net blotch, Fusarium root rot, common root rot	230 - 330 mL
Wheat*	Loose smut, stinking smut (common bunt), seed-borne dwarf bunt, seed rot, seedling blight caused by *Cochliobolus sativus*, *Fusarium*, *Pythium* spp., *Aspergillus*, *Penicillium* and *Alternaria* spp., seed-borne Septoria	Root rot caused by *Cochliobolus sativus* and *Fusarium* spp.	230 - 330 mL
Oats	Covered smut, loose smut, seed rot and seedling blight caused by *Fusarium* spp.	Root rot caused by *Cochliobolus sativus*	330 mL
Rye*	Damping-off, seedling blight and seed decay, stem smut, seed rot and seedling blight caused by *Pythium* spp., and *Penicillium* spp. *Aspergillus* spp. and *Alternaria*	Root rot caused by *Fusarium* spp. and *Cochliobolus sativus*	230 - 330 mL
Triticale	Damping-off, seedling blight and seed decay		200 mL
Corn (field and sweet)	Damping off, seed decay		280 mL
	Corn head smut***		560 - 750 mL
Common dry beans, snap dry beans	Early season seed rot, root rot and seedling blight caused by *Rhizoctonia solani*, seedborne Anthracnose (*Colletotrichum lindemuthianum*)		260 mL
Lentil	Early season root rot and seedling blight caused by *Botrytis cinerea*, *Fusarium*, *Pythium* spp. and *Rhizoctonia solani*, seed rot, seedling blight		330 mL
Peas **	Seed rot and seedling blight caused by *Mycosphaerella* (Ascochyta) *Fusarium* spp. and *Rhizoctonia solani* and *Pythium*		260 - 330- mL
Soybeans	Seed rot and seedling blight caused by *Phomopsis* spp., *Rhizoctonia solani* and *Fusarium* spp.		260 mL
Flax (including edible oil flax)	Seed rot, root rot, seedling blight caused by *Rhizoctonia solani* and *Fusarium*		525 mL

* The 230 mL rate will give partial control of true loose smut in wheat and barley and stem smut in rye. Use 330 mL rate for the control of seed-borne Septoria on wheat and seed rot and seedling blight caused by *Fusarium* spp., *Cochliobolus sativus*, *Pythium* spp., *Penicillium* spp., *Aspergillus* spp., *Alternaria*; also suppression of root rot caused by *Cochliobolus sativus* on cereals (wheat, barley, oats and rye). ** Use a 260 mL rate for control of *Rhizoctonia solani* and *Fusarium* spp. Use a 330 mL rate for control of *Mycosphaerella pinodes* (Ascochyta). *** Avoid planting corn under cold, wet conditions. Stress conditions during the first few weeks after planting may increase the incidence of head smut. Will not control soil-borne head smut.

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Bushels Treated

Container size	Barley*	Oats**	Wheat***	Lentils/peas***
10 L	202 (low rate); 139 (high rate)	187	161 (low rate); 111 (high rate	111
200 L drum	3,985 (low rate); 2,778 (high rate)	3,921	3,190 (low rate); 2,222 (high rate)	2,222

* Based on 48 lbs/bushels ** based on oats at 34 lbs/bushels *** based on wheat at 60 lbs/bushels

Application Tips

Treat only clean seed of known quality that is free of debris and dust. Uniform coverage is critical to obtain optimum results; uneven seed coverage may not give the desired level of disease control. Consult manufacturer's label or recommendations with regard to the use of Vitaflo 280/Vitaflo SP/Loveland Vitaflo and rhizobia inoculants.

How it Works

Thiram is a fungicide that controls diseases carried on the seed. Carbathiin is a systemic fungicide that penetrates the seed coat to control diseases inside the seed and seedling.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting except for the following crops: Soybeans – Do not graze or feed livestock on forage and hay on treated areas. Dry beans – Do not graze or feed on bean forage for 60 days after planting. Barley, oats, wheat – Do not graze or feed on treated area for six weeks after planting. Do not use treated seed for food, feed or oil processing.

Environmental Precautions

Do not contaminate ponds, lakes or streams.

Toxicity

Thiram: Oral LD_{50} (rats) = 2,600 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Carbathiin: Oral LD_{50} (rats) = 2,900 mg/kg. Dermal LD_{50} (rabbit) = > 4,000 mg/kg.

Storage

Do not store Vitaflo 280/Vitaflo SP/Loveland Vitaflo at temperatures above 35°C. These products will not freeze solid even in extreme winter temperatures. If containers have been in storage for several months, some settling may occur and containers may require agitation.

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Seed Treatment Selector Chart

Cereals

Problems	Acceleron Standard	Cruiser 5FS	Cruiser Maxx Vibrance Cereals	Cruiser Maxx – Austria	Gaucho	Insure Cereal	Kinto 50WS	Kinto 600FS	Kinto 600FS (Centre Of Seed Protection)	Raxil MD	Raxil Pro	Raxil Pro Shield	Raxil T	Rizex 300F	Vibrance Quattro	Vibrance S	Vitalis 200/Vitalis XP/Landmaster Vitalis
Barley																	
Diseases																	
Common root rot		S		S	S	S	S				S	S	S	S	S	S	S	S	S
Seed rot		C		C	C	C	C	C			C	C	C	C	C	C	C	C	C
Seedling blight		C		C	C	C	C				C	C	C	C	C	C	C	C	C
Pythium damping off				C	C	C	C	C				C	C	C		C	C	C	
Fusarium crown and root rot		S		S	S	S					S	S	S	S	S	S	S	S	
Covered smut		C		C	C	C	C				C	C	C	C	C	C	C	C	C
False loose smut		C		C	C	C	C				C	C	C	C	C	C	C	C	C
True loose smut		C		C	C	C	C				C	C	C	C	C	C	C	C	C
Leaf stripe											C	C	C	C		C			C
Net blotch																			S
Seed-borne *Septoria*				C								C				C		C	
Take all				S	S												S	S	
Diseases																			
Rhizoctonia	S		S	S	S									S		S			
Wheat (including Durum)																			
Diseases																			
Common root rot		S		S	S	S	S				S	S	S	S	S	S	S	S	S
Seed rot		C		C	C	C	C	C		C	C	C	C	C	C	C	C	C	C
Seedling blight		C		C	C	C	C			C	C	C	C	C	C	C	C	C	C
Pythium damping off				C	C	C	C	C		C		C	C	C		C	C	C	
Fusarium crown and root rot		S		S	S	S					S	S	S	S	S	S	S	S	
Loose smut		C		C	C	C	C			C	C	C	C	C	C	C	C	C	C
Common bunt		C		C	C	C	C			C	C	C	C	C	C	C	C	C	C
Seed-borne *Septoria*												S			C	S		C	C
Take all				S	S													S	

C = Control, S = Suppression

Continued

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Seed Treatment Selector Chart

Cereals (continued)

Problem	Apron XL 350 ES Gaucho Extra 600	Charter 450 Dividend Extreme 450	Cruiser 350	Cruiser Max Gaucho Extra	Cruiser Maxx Extra	Dividend	Gaucho Extra	Gaucho 600	Raxil Pro	Raxil 060 ES Dividend Extreme	Raxil 060ES M Seed Protection	Redigo	Redigo M	Rancona Dyna	Rancona Opal	Rancona Pulse	Sibutol	Rancona 100	Rancona Extra	Rancona M	Vitaflo 280 Redigo M Deter Extra
Insects																					
Wireworms	✓		✓	✓	✓					✓	✓	✓					✓		✓		
Cats																					
Diseases																					
Common root rot		✓			✓	✓		✓						✓	✓	✓	✓	✓	✓	✓	✓
Seed rot		✓			✓	✓		✓	✓					✓	✓	✓	✓	✓	✓	✓	✓
Seedling blight		✓			✓	✓		✓						✓	✓	✓	✓	✓	✓	✓	✓
Pythium damping off					✓	✓		✓	✓						✓	✓	✓		✓	✓	
Fusarium crown and root rot		✓												✓	✓	✓	✓		✓		
Loose smut		✓				✓	✓	✓						✓	✓	✓	✓	✓	✓	✓	✓
Covered smut		✓				✓	✓	✓						✓	✓	✓	✓		✓	✓	✓
Seed-borne septoria																					
Insects																					
Wireworm	✓				✓	✓											✓		✓		
Rye																					
Diseases																					
Common root rot								✓						✓					✓	✓	✓
Seed rot								✓	✓					✓					✓	✓	✓
Seedling blight								✓						✓					✓	✓	✓
Pythium damping off								✓	✓										✓	✓	✓
Fusarium crown and root rot														✓					✓	✓	
Stem smut																					✓
Common bunt								✓											✓	✓	
Seed-borne Septoria																				✓	

✓ = Control, S = Suppression

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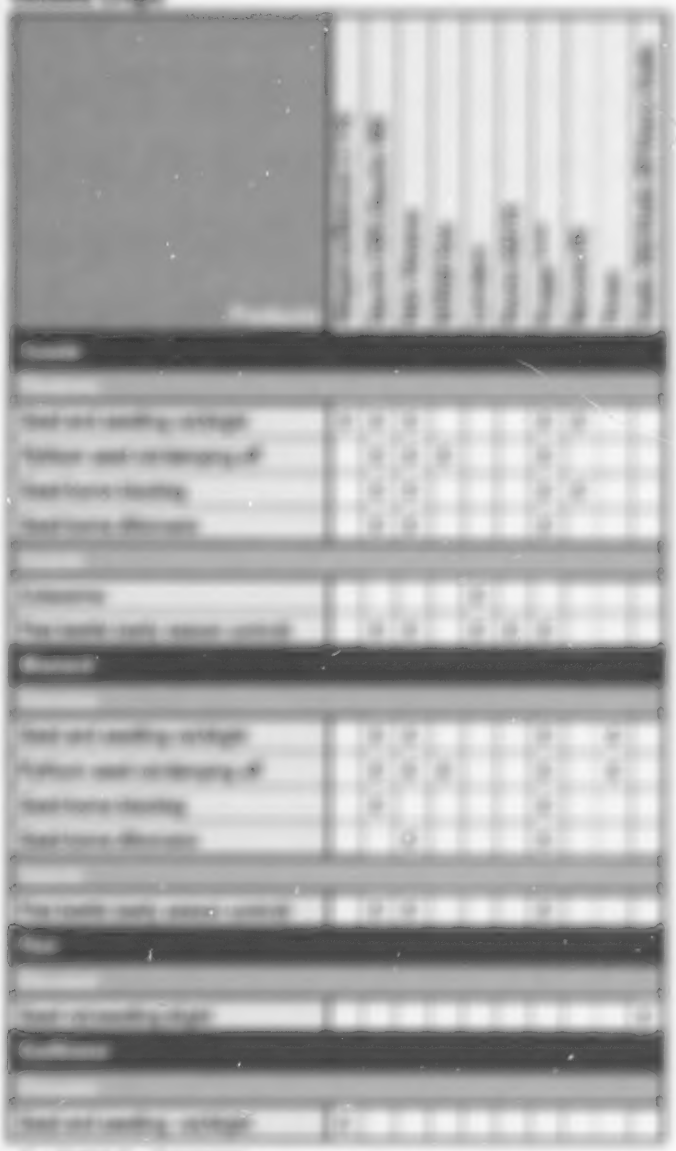
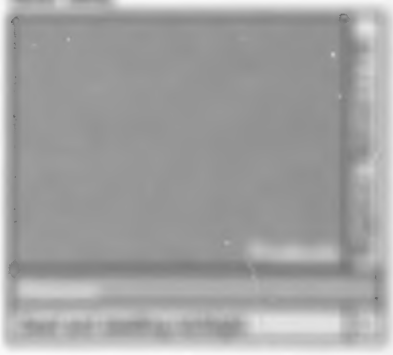
Seed Treatment Selection Chart

Mixed Crops



Peas

Forages



Overall Treatment Outcomes Sheet

Status of Cases

Provinces

Foliar Fungicide Index

Powdery Mildew
Fungicide Groups Classifications by Mode of Action

Fungicide – Other Powdery Mildew Rate

Quinoxyfen
Triazole

Product Registrations

Name	Page	Name	Page
Aviator Xpro		Luna Sensation	
Azoxystrobin		Metconazole	
Bravo		Myclobutanil	
Cabrio		Nexicor	
Caramba		Orbit	
Cevya		Pristine	
Cotegra		Propiconazole	
Delaro		Prosaro	
Domark		Quadris	
Elatus		Quadris Top	
Fontelis		Quilt	
Gem		Quilt Xcel	
Headline		Revysol	
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Lucento		Stratego YLD	
Luna Experience		Tebuconazole	
Luna Privilege		Trivapro	

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Fungicide Group Classification by Mode of Action

Chemical Family	Active Ingredients	Found In			
Group 1	**Inhibition of cable formation.**				
Benzimidazole	thiophanate-methyl	Senator 70WP	Senator FDF1		
Group 2	**Affect DNA and RNA synthesis and metabolism.**				
Acetylacetamides	ipralkone	Rovral 1KI 02	Rovral Flo		
Group 3	**Demethylation inhibitors.**				
Triazoles (includes conazoles)	difenoconazole	Duerglo	Quadris Top	Stadium	
	propiconazole	Bayfair XP Bumper 418 EC	Pivot 418 EC Propel	Quilt Strategy 250 EC	Tilt 250E Tigershot
	prothioconazole	Delaro 325 SC	Proline 480 SC	Provaro 250 EC	Proponaz
	tebuconazole	Folicur 250 EW	Fuse	Palisan	Provaro 250 EC
	metconazole	Caramba	Quash	Twinline	
	flutriafol	Vultaxx			
Group 4	**Phenylamides. Affects RNA synthesis.**				
Acylalanines	metalaxyl	Ridomil Gold			
Group 5	**Morpholines inhibition of sterol biosynthesis in sterol biosynthesis.**				
Morpholines	dimethomorph	Acrobat 50 WP			
Group 7	**Succinate dehydrogenase. Inhibits mitochondrial function.**				
Pyridinyl ethyl benzamide	fluopyram	Propulse			
Carboxamides	boscalid	Lance WG	Lance WDG		
	fluopyramid	Pistachio			
	penthiopyrad	Fontelis	Vertisan		
	benzovindiflupyr	Elatus			
Group 8					
Pyrimidine	pyrimethanil	Scala			
Anilinopyrimidin	cyprodinil	Vanguard			
Group 11	**Enables type active and maintenance. Inhibit mitochondrial respiration.**				
Acrylate	famoxadone	Tanos 50 DF			
Strobilurin	azoxystrobin	Bayfair XP Elatus	Duerglo Quadris	Quadris Top Quilt	Stadium Tigershot
	fenaminstrobin	Reason 500 SC			
	pyraclostrobin	Cabrio Plus Headline EC	Lance WG Pristine	Twinline	
	trifloxystrobin	Delaro 325 SC	Strategy 250 EC		
	picoxystrobin	Acapela			
	fluoxastrobin	Evito			
Phenylpyridine	fluazinam	Vanguard	Stadium		
Group 21					
Imidazole	cyazofamid	Ranman 400 SC	Torrent		
Group 22					
	amisulbrom	Leimay 10 SP			

continued

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Fungicide Group Classification by Mode of Action					
Chemical family	Active ingredients	Found in			
Group 29					
Pyridine	fluazinam	Allegro 500F			
Group 33					
Phosphonates	sodium, potassium, ammonium phosphites	Phostrol			
Group 40					
Amide Fungicide	mandipropamid	Revus			
Morpholine	dimethomorph	Acrobat 50 WP			
Group 45					
Qol fungicide (Quinone o Inhibitor)	ametoctradin	Zampro			
Group M	**Multi-site activity**				
Chloronitrile	chlorothalonil	Bravo 500 Bravo ZN	Ridomil Gold Tattoo C	Echo 720 Echo 90 DF	
Dithiocarbamates	mancozeb	Dithane DG 75	Gavel 75 DF	Manzate 200 75DF/Pro-stick	Penncozeb 75DF Rancozeb/ Penncozeb 80WP
	metiram	Cabrio Plus	Polyram DF		
Inorganic	copper	Copper 53W	Copper Spray	Cueva	
	copper hydroxide	Cuppercide WP	Kocide 2000	Parasol WG	
Phthalimide	sulfur	Kumulus DF			
Group U	**Unclassified**				
Acetimide	cymoxanil	Curzate 60 DF	Tanos 50 DF		
Carbamate	propamocarb hydrochloride	Tattoo C			

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Acapela

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Acapela (PCP# 30470)	E.I. duPont Canada	Picoxystrobin: 250 g/L	Suspension	9.6 L, 115.2 L

Crops, Diseases, Rate and Timing

Crops	Diseases	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	325 - 486 mL	Apply at 20 - 50 percent bloom prior to disease development. Under high disease pressure, make a second application, from a different fungicide group, 7 - 14 days later. Use the higher rate or shorter interval when disease pressure is high. A second application of this product can only be carried out if both applications are at the lowest rate and sprays are not sequential.
Dry legumes (chickpea, field pea, lentil, broad beans (excludes faba beans), dry beans*)	Mycosphaerella blight (*Mycosphaerella pinodes*) on field pea, Ascochyta blight (*Ascochyta lentis*) on lentil, Asian soybean rust (*Phakopsora pachyrhizi*), Anthracnose (*Colletotrichum truncatum*) in lentils	240 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia rot/white mould (*Sclerotinia sclerotiorum*)	350 mL	Make initial preventative application at beginning of bloom and follow with second application 7 - 10 days later at full bloom.
Wheat	Leaf rust (*Puccinia recondita*), septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), tan spot (*Pyrenophora tritici-repentis*), stripe rust (*Puccinia striiformis*)	175 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high. Apply at Feekes 9 (flag leaf emerged). Do not apply after flowering starts (Feekes 10.5).
Barley	Septoria leaf blotch (*Septoria tritici*), powdery mildew, (*Erysiphe graminis*), stripe rust (*Puccinia striiformis*), net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*)	175 - 350 mL	
Oats	Powdery mildew (*Erysiphe graminis*), stripe rust (*Puccinia striiformis*), crown rust (*Puccinia coronata f. sp. Avenae*)	175 - 350 mL	
Rye, triticale	Leaf rust (*Puccinia recondita*), septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), stripe rust (*Puccinia striiformis*), scald (*Rhynchosporium secalis*)	175 - 350 mL	
Corn (field corn, sweet corn, seed popcorn)	Northern corn leaf blight (*Setosphaeria turcica, Exserohilum turcicum*)	215 - 325 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.

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Crops	Diseases	Rate per acre	Staging and specific comments
Soybean	Asian soybean rust (*Phakospora pachyrhizi*), brown spot (*Septoria glycines*), frogeye leafspot (*Cercospora sojina*)	175 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia stem rot/white mould (*Sclerotinia sclerotiorum*)	350 mL	Make initial preventative application at 100% bloom (1 flower blooming on all plants) and follow with 2nd application 7 - 10 days later at full bloom.

*See label for registered bean and pea types.

Registered Tank Mixes
Travallas herbicide.

Application Information
How to Apply: Ground and aerial application. **Water Volume**: Ground: 45 L/acre minimum. Aerial: 20 L/acre minimum.

Application Tips
Use sufficient water to ensure thorough coverage of plants.

How it Works
The active ingredient picoxystrobin is a broad spectrum strobilurin fungicide that has curative and locally systemic activity.

Restrictions
Maximum Number of Applications: Dry legumes – make no more than 1 application before switching to a fungicide with a different mode of action; maximum season use rate 700 ml per acre. Cereal grains, soybeans – make no more than 2 applications before switching to a fungicide with a different mode of action; maximum season use rate 1100 ml per acre. Corn – make no more than 2 applications before switching to a fungicide with a different mode of action; maximum season use rate for field, seed or popcorn is 1100 ml per acre and sweet corn is 1400 ml per acre. **Pre-harvest intervals**: Canola – 28 days, Dry legumes and soybeans – 14 days, Cereal grains – 45 days, (7 days for forage, 14 days for hay), Corn – 7 days. **Rainfall:** Rainfast 30 minutes after application. **Re-cropping**: Crops that are on the product label may be re-planted immediately after harvest. All other crops – 10 months following last application of picoxystrobin. **Re-entry**: Do not re-enter treated areas within 12 hours of application.

Environmental Precautions
Observe prescribed buffer zones. Minimize off-target drift to reduce the effects on beneficial insects at the field boundary. Do not apply to areas prone to runoff, and delay spraying if heavy rainfall is forecast.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed.

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Acrobat 50 WP

Group 40

Formulation

Product	Company	Active ingredient	Formulation	Container size
Acrobat 50 WP (PCP# 27700)	BASF Canada	Dimethomorph: 50 %	Wettable powder	1.82 kg

Crops, Diseases Controlled, Rates and Staging

Crop	Diseases	Rate per acre	Staging
Potatoes	Late blight (*Phytophthora infestans*) and reduction of late blight tuber rot	182 g	Make the first application when disease threatens or when first visible signs of disease occur within the field or nearby. Apply every 5 - 7 days under high disease pressure or every 7 - 10 days under low disease pressure.

Registered Tank Mixes

Do not apply Acrobat alone. Apply Acrobat 50 WP in a tank mix with Polyram DF or Dithane Rainshield™ or Bravo 500 at the recommended product label rate. Follow the most restrictive application directions for each of the tank mix partners with respect to the maximum number of applications, application timing and pre-harvest intervals.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 80 L/acre. Aerial: 20 L/acre minimum.

Application Tips

It is recommended to apply Acrobat 50 WP in alternation with a fungicide having a different mode of action. Under high level of late blight infection, apply this product after topkill to reduce tuber blight.

How it Works

Acrobat 50 WP has protectant, systemic and anti-sporulant activity. Dimethomorph penetrates the plant and moves upward to protect the leaves and stems.

Restrictions

Rainfall: Do not apply if rain is expected within 2 to 3 hours of spraying and apply to dry foliage. **Pre-harvest Intervals**: Do not apply Acrobat 50 WP within 4 days of harvest. **Maximum Allowable Applications**: Do not apply more than 3 applications per season. **Re-cropping**: Do not plant a new crop in the treated area within 120 days of the last application.

Environmental Precautions

Acrobat tank mix combinations are toxic to fish and other aquatic organisms. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (male rats) = 2,939 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store under cool and dry conditions in secure, well ventilated buildings.

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Allegro 500 F

Group 29

Formulation

Product	Company	Active ingredient	Formulation	Container size
Allegro 500 F (PCP# 27517)	Syngenta	Fluazinam: 40.0%	Liquid	10 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Dry shelled beans[1]	White mold (*Sclerotinia sclerotiorum*)	0.24 - 0.4 L	Begin application when plants are at early to mid bloom (10 to 50% bloom), and make one more application 7 - 10 days later. Under conditions favorable for severe disease development, use the higher rate.
Potato	Late blight (*Phytophthora infestans*)	0.16 L	Begin applications when the plants are 15 to 20 cm tall or when conditions favour disease development. Repeat application at intervals of 7 to 10 days. Do not apply more than the maximum seasonal use rate of 1.6 L per acre during each growing season. Do not make more than 3 sequential applications per season before alternating to a fungicide with a different mode of action.
Potato	White mold (*Sclerotinia sclerotiorum*)	0.16 - 0.24 L	Begin applications at full bloom. Repeat applications at 7 - 10 day intervals. When white mould pressure is low to moderate, use 160 ml/acre. When conditions favour moderate to high white mould pressure, increase the rate to 240 ml/acre. Do not make more than three sequential applications.
Soybean	White mold (*Sclerotinia sclerotiorum*)	0.35 - 0.47 L	Begin application at the R1 (early bloom) to R2 (full bloom) stage. If necessary apply again 10 - 14 days later at early pod formation (R3). When disease pressure is low use 0.36 L per acre rate. For conditions favouring moderate or high disease pressure use 0.47 L/acre. Do not apply after the R3 stage. Do not exceed 2 applications per year.

[1] Registered under User Requested Minor Use Label Expansion program.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground and aerial application. Do not apply to soybean by air.
Water Volume: Ground: 80 - 240 L/acre. Aerial: 20 L/acre minimum.

Application Tips

Optimum disease control is achieved when timing of application is based on environmental factors that favour disease development. For potatoes, do not exceed 10 applications each growing season. For edible beans and soybeans, do not exceed 2 applications each growing season.

How It Works

Fluazinam is a pyridinamine fungicide with protective (contact) activity.

Restrictions:

Pre-harvest Intervals: Dry shelled beans - 30 days, potatoes - 14 days, soybeans - do not apply after the R3 stage.
Re-cropping: Areas treated with Allegro 500 F may be replanted with potatoes and dry shelled beans as soon as practical after the last application. Other root crops and leafy vegetables can be planted 30 days after the last application. All other crops can be planted 70 days after the last application. **Re-entry**: Do not enter treated areas during the restricted re-entry interval of 24 hours.

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Allegro 500 F (cont'd)

Environmental Precautions
Allegro is toxic to aquatic organisms, non-target terrestrial plants and wild mammals. Observe buffer zones specified on the product label.

Toxicity
Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Heated storage required. Store in a dry storage area separate from feed, fertilizer or food.

Astound

Group 9, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Astound (PCP# 29648)	Syngenta	Cyprodinil: 37.5% Fludioxonil: 25.0%	Wettable granule	6.28 kg

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	314 - 395 g	Apply at 20 - 50% bloom stage. Use higher rate under conditions of high disease pressure.

Registered Tank Mixes
Matador 120EC at 34 ml/acre.

Application Information
How to Apply: Apply with ground equipment or by air. **Water Volume**: Ground: minimum of 80 L/acre. Air: minimum of 18 L/acre.

Application Tips
Ensure product is slowly added to spray tank/chemical handler. Higher water volumes will ensure product is completely dissolved and provide thorough coverage of the plant to achieve optimum disease control. If pump or nozzle screens must be used, ensure they are 50 mesh or coarser. Do not apply more than 2 consecutive applications of Astound fungicide or other fungicides in the same group in a season.

How It Works
Astound works systemically and on contact to provide both preventative and curative protection from sclerotinia.

Restrictions
Rainfall: Product may be applied within 2 hours of rain. **Pre-harvest Interval**: Do not apply within 35 days of harvest. **Re-cropping Restrictions**: Do not plant any other crop for a period of 30 days after harvest or crop failure unless Astound is registered for that use.

Environmental Precautions
Astound is toxic to aquatic organisms. Observe buffer zones specified on the label. Do not contaminate irrigation or drinking water supplies or aquatic habitats when cleaning equipment or disposing of wastes. Do not apply this product through any type of irrigation system.

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Toxicity
Oral LD_{50} (male rats) > 5,000 mg/kg. Dermal LD_{50} (rabbit) > 2,000 mg/kg.

Storage
Heated storage not required. Store in a cool, dry storage area separate from food, fertilizer or feed.

Bravo 500/Bravo ZN/Echo 720/Echo 90 DF

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Bravo 500 (PCP# 15723)	Syngenta	Chlorothalonil 500 g/L	Suspension	10 L, 450 L
Bravo ZN (PCP# 28960)	Syngenta	Chlorothalonil 500 g/L	Suspension	10 L, 450 L
Echo 720 (PCP# 29366)	Sipcam Agro/UAP Canada	Chlorothalonil 720 g/L	Suspension	5.66 L, 450 L, 964 L
Echo 90 DF (PCP# 29356)	Sipcam Agro/UAP Canada	Chlorothalonil 90%	Dry flowable	1 kg

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases controlled	Rate per acre				Staging and specific comments
		Bravo ZN	Bravo 500	Echo 720	Echo 90DF	
Corn (sweet)	Common rust (*Puccinia sorghi*)	1.29 L	1.29 L	0.80 L	0.73 kg	Apply when symptoms are first noticed and repeat again 10 - 14 days later. Do not make more than 2 applications per season.
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	1.2 - 1.6 L in first application and 0.8 - 1.2 L in subsequent applications	1.2 - 1.6 L in first application and 0.8 - 1.2 L in subsequent applications	0.85 - 1.13 L in first application and 0.56 - 0.85 L in subsequent application	0.66 - 0.89 kg for first application and 0.44 - 0.66 kg in all other applications	Make first application at very early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season.
Dry peas	Ascochyta blight (*Mycosphaerella pinodes*)	0.8 - 1.2 L	0.8 - 1.2 L	0.56 - 0.85 L	0.44 - 0.66 kg	Apply beginning at early flowering. Make a second application at early pod set, approximately 10 days later. Always apply the higher rate when conditions are favourable for disease. If conditions remain favourable for disease, a third application should be made 10 to 14 days later during pod filling. Do not make more than 3 applications per season.
Lentil	Ascochyta blight (*Ascochyta lentis*) Anthracnose (*Colletotrichum truncatum*)	0.8 - 1.6 L	0.8 - 1.6 L	0.56 - 1.13 L	0.44 - 0.89 kg	Apply beginning at pre-flowering prior to row closure, make a second application 10 to 14 days later (during bloom period). Do not make more than 2 applications per season.

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Bravo 500/Bravo ZN/Echo 720/Echo 90 DF (cont'd)

Crops	Diseases controlled	Rate per acre				Staging and specific comments
		Bravo ZN	Bravo 500	Echo 720	Echo 90DF	
Potato	Late blight (*Phytophthora infestans*)	0.40 - 1.0 L	0.40 - 1.0 L	0.32 - 0.80 L	0.36 - 0.92 kg	Begin applications when plants are 15 - 20 cm high, or when disease threatens. Repeat applications as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7 day intervals.
	Early blight, (*Alternaria solani*), botrytis vine rot (*Botrytis cinerea*)	0.64 - 1.0 L (early blight only)	0.64 - 1.0 L	0.48 L	0.54 - 0.92 kg	
Wheat	Septoria leaf spot, septoria glume blotch (*Septoria* sp.) and tan spot (*Pyrenophora tritici-repentis*)	0.8 - 1.0 L	0.8 - 1.0 L	0.6 - 0.80 L	0.72 - 0.92 kg	Apply at flag leaf emergence and repeat 10 - 14 days later when head is visible. A third application, at full head emergence may be necessary if conditions favour disease spread. Do not make more than 3 applications per season.
	Fusarium head blight (scab) (suppression) (*Fusarium* sp.)	0.8 - 1.0 L	0.8 - 1.0 L	0.60 - 0.80 L	0.69 - 0.92 kg	Apply at early flowering. For best results make application prior to conditions that favour infection (before flowering has started in the majority of tillers and wet weather is due). Do not make more than 2 applications per season.

'NR' = Not registered

Registered Tank Mixes

For Bravo 500 only.

Product	Tank mix partner	Tank mix rate	Additional diseases controlled	Additional diseases suppressed	Specific comments
In potatoes only					
Bravo 500	Quadris Flowable	Bravo 500 at 1.0 L/acre PLUS Quadris Flowable at 0.202 L/acre	Early blight (*Alternaria solani*)		Apply on a 7 to 14 day interval, starting prior to disease development. Do not exceed more than 3 applications per season. Do not apply to potato plants less than 2 days before harvest.
Bravo 500 or Bravo ZN	Ridomil Gold 480EC or Ridomil Gold 480SL	Bravo 500/Bravo ZN at 0.8 L/acre PLUS Ridomil Gold at 0.05 L/acre	Late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), botrytis vine rot (*Botrytis cinerea*)	Pythium rots (*Phythium* spp.) and Pink rot (*Phytophthora erythroseptica*)	Apply at 14 day intervals, starting prior to disease development. Apply a registered contact fungicide at 7 day intervals after the application of this tank mix. Do not exceed 3 applications per season. Pre-harvest interval: 14 days.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 40 - 400 L/acre for diluted sprays and 20 - 40 L/acre for concentrated sprays. Aerial: 20 - 40 L/acre.

Application Tips

Thorough coverage is essential for disease control.

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[illegible]

Chlorothalonil is a multi-site preventive fungicide that begins to work on contact to protect plant foliage from disease infection.

[illegible]

Rainfast: Bravo WS, Bravo ZN, Echo 720 and Echo 400F are weather once dry spray solution has dried on the plant surface approximately 10 minutes. **Pre-harvest intervals:** cherry, flower corm (-s), [illegible] (-s), potatoes (-), wheat (-m). **Crop-specific:** Bravo WS, Bravo ZN: 14 days; Echo 720, Echo 400F: 45 days. **Grazing:** Do not feed the hay from treated crop to livestock. Do not allow grazing of treated crop. **Re-entry:** Do not re-enter treated area within 48 hours.

Environmental Precautions

Bravo WS and Bravo ZN are toxic to fish, aquatic invertebrates and marine/estuarine organisms. Runoff from treated areas may be hazardous to aquatic organisms in neighbouring areas. Do not apply when weather conditions favour drift from areas being treated. Observe a buffer zone of 100 metres for aerial applications and 10 metres for ground applications to protect aquatic habitats.

Toxicity

Oral LD_{50} (rats) > 4,500 mg/kg. Dermal LD_{50} (rats) > > 20,000 mg/kg.

Storage

Product storage not required. Store in a cool, dry place away from food or feed.

Cabrio Plus

[illegible] Group 11, 40

Formulations

Product	Company	Active ingredient	Formulation	Container size
Cabrio Plus (EPW 20/08)	BASF Canada	Pyraclostrobin 5% Metiram 55%	Water dispersable granular	4 kg

Crops, Diseases, Timing, and Application Information

Crop	Disease	Rate per acre	Timing and specific comments
Potatoes	Early blight (*Alternaria solani*)	0.45 - 1.36 kg	Begin applications prior to any disease or other disease resistance symptoms appear. For early blight apply on a 7 - 14 day interval. For late blight apply on a 7 - 10 day interval. Do not make more than one application of Cabrio Plus before alternating to a fungicide with a different mode of action. Do not exceed 7 applications per season.
	Late blight (*Phytophthora infestans*)	0.45 - 1.36 kg	

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 94 L/acre minimum. Aerial: 23 L/acre minimum.

How It Works

Pyraclostrobin is a respiration inhibitor and has protective and curative action. Metiram is a broad spectrum fungicide with protective action.

Restrictions

Grazing: Crop can be ground or fed to livestock. **Pre-harvest Interval:** 7 days. **Re-entry:** Do not re-enter treated area for 12 hours. **Re-cropping:** Crops listed on the Cabrio Plus label may be planted immediately following the last application. All other crops can be planted 14 days after last application.

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Environmental Precautions

[illegible] **Hazard** [illegible]

Toxicity

Ingestion [illegible] **Skintouch** [illegible]

Storage

[illegible]

Caramba

[illegible]

Formulations

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Usage, Glassware Incompatibility, Safety and Shipping

Usage	Glassware	Mixed use ratio	Shipping [illegible] Specifications
Mixed Including [illegible]	[illegible]	1:10 – 1:5 oz.	[illegible]
	[illegible]	1:50 oz.	[illegible]
Hobby	[illegible]	1:10 – 1:5 oz.	[illegible]
	[illegible]	1:50 oz.	[illegible]
Use	[illegible]	1:10 – 1:5 oz.	[illegible]
	[illegible]	1:50 oz.	[illegible]

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Introduction

Groups - Diseases Controlled - Dates used Planting

Application Information

Mix in Apply - Immediately before mix - To mix apply to, or **Water Volume** - All in one operation.

Application Tips

For optimum crop vigour, control of weeds throughout the crop is vital and this applies to any residue. Only use appropriate control and weed out to remaining crop. Apply to crop at the recommended rate for the crop. Do not apply to crop under stress from drought, waterlogging, disease, pests or nutrient deficiency. Do not apply to crop under stress from drought, waterlogging, disease, pests or nutrient deficiency as crop may not recover. Apply to crop at the recommended rate for the crop.

Do not apply to crop under stress from drought, waterlogging, disease, pests or nutrient deficiency as crop may not recover. Apply to crop at the recommended rate for the crop. Do not apply to crop under stress from drought, waterlogging, disease, pests or nutrient deficiency as crop may not recover.

Mixing Instructions

When applying correctly, the active ingredient in Caravan SPC is absorbed, translocated to the sensitive growing points of weeds and kills them. Weeds may not be killed immediately but will stop growing soon after application and will gradually decline. Susceptible weeds may show symptoms of yellowing and reddening before collapse. Control may be slower in dry conditions.

Restrictions

Do not use on stressed crops - Caravan SPC cannot replace losses and shielding crop. Do not graze crop.

Environmental Precautions

Do not allow the product to enter drains, sewers or waterways. Do not contaminate soil or groundwater. Prevent runoff from entering storm drains.

Handling

Wear PPE as specified in Section 8. Avoid contact with skin and eyes. Do not eat, drink or smoke while handling.

Storage

Store in a cool, dry, well-ventilated area away from incompatible materials. Keep containers tightly closed when not in use. Protect from direct sunlight and heat sources. Store at temperatures between 5°C and 25°C. Shelf life: 24 months from the date of manufacture when stored under recommended conditions.

Eugenol 2,6-Di(Eugenol-Spiro-γ-Eugenoxide) Bis-Oxide (DEESE/Pharmaceutical Grade)

Specifications

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Drugs, Allergens, Contraindications and Alerts

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Cuprous: 50 W/Copper Spray/Copperoxide WP/Kocide 2000/Parasol WG/Cueva (cont'd)

Products	Registered crops	Diseases controlled	Rate per acre	Staging
Copperoxide WP	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	1.0 - 1.5 kg	Apply when disease threatens and continue for 4 to 5 applications. Spray at 10 to 14 day intervals.
Kocide 2000	Beans	Bacterial blight (*Pseudomonas phaseolicola*) Common blight (*Xanthomonas phaseoli*)	1.25 - 2.50 kg	Apply when plants are 15 cm tall.
	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	1.12 - 2.24 kg 2.50 kg (one foli)	Apply when plants are 15 cm high. Repeat at 7 to 10 day intervals.
Parasol WG	Beans	Bacterial blight (*Pseudomonas phaseolicola*) Common blight (*Xanthomonas phaseoli*)	1.0 - 1.22 kg	Apply when plants are 15 cm tall. Repeat at 7 to 14 days intervals.
	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.49 - 1.01 kg 1.26 kg (one foli)	Apply when plants are 12 to 15 cm high. Repeat at 7 to 10 day intervals.
	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	1.0 - 1.50 kg	Apply when disease threatens and continue for 4 to 5 applications.
Cueva	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*), septoria leaf spot (*Septoria apiicola*)	0.5% - 2.0% solution	For best control, start treatments 2 weeks before disease normally appears OR begin treatments when disease first appears. Repeat every 5 - 10 days as required. If disease pressure is high, apply at the higher rate.
	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	0.5% - 2.0% solution	
	Dry bean, field pea, soybean	Bacterial blight (*Xanthomonas axonopodis* pv. *phaseoli*), Halo blight (*Pseudomonas syringae* pv. *phaseolicola*), common blight (*Xanthomonas campestris* pv. *phaseoli*), brown spot (*Pseudomonas syringae* pv. *syringae*), powdery mildew (*Erysiphe* spp.), rust (*Uromyces appendiculatus*)	0.5% - 2.0% solution	

Registered Tank Mixes

Kocide 2000 Mancozeb DF or Mancozeb Pro-Stick is potato crops. Copperoxide WP Mancozeb Parasol WG Mancozeb (80%) (1.7 - 2.5 kg/acre for early and late blight control in potatoes.

Application Information

How to Apply: Ground application only. Do not apply by air. **Water Volume:** Copper 51 W/Copper Spray - 404 L/acre Cueva - 140 - 280 L/acre. Kocide 2000 Parasol WG - Use sufficient water to obtain adequate spray coverage.

Application Tips

In potatoes, Kocide 2000/Parasol WG and Copperoxide WP may be applied with a dedicated or one-hill or done after one-hill, prior to harvest to reduce the risk of late blight infection.

How It Works

Copper hydroxide, copper oxychloride, copper sulphate and copper octanoate are contact fungicides.

Restrictions

Pre-harvest Intervals: Do not apply to crops within 1 day of harvest.

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Environmental Precautions

Copper-based fungicides are toxic to fish and other aquatic organisms. Keep out of any body of water. fish may be killed.

Toxicity

Copper hydroxide: Oral LD_{50} (rats) = 945 - 2,000 mg/kg. Copper oxychloride: Oral LD_{50} (rats) = 1,600 mg/kg. Copper sulphate: Oral LD_{50} (rats) = 1,000 mg/kg. Copper octanoate: Oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry, ventilated place, away from foods and feeds.

Curzate 60 DF

Group U

Formulation

Product	Company	Active ingredient	Formulation	Container size
Curzate 60 DF (PCP# 28,099)	E.I. duPont Canada	Cymoxanil: 60%	Dry flowable	1.0 kg

Crops, Diseases Controlled and Rates

Crops	Diseases controlled	Rate	Staging and specific comments
Potatoes	Late blight *(Phytophthora infestans)*	Curzate: 1.00 kg/acre **Plus** Manzate DF: 0.55 - 0.85 kg/acre	Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 - 7 day intervals, however, at least 20 days must pass between a 2nd and 3rd application. Apply no more than 6 applications per crop. Use higher rate of Manzate DF under conditions of high disease pressure. Do not mix and apply more than 38 kg of Curzate 60 DF Fungicide per day for ground application (enough to treat 420 acres). Do not mix and apply more than 50 kg of Curzate 60 DF Fungicide per day for aerial application (enough to treat 540 acres).

Registered Tank Mixes

Manzate 200 DF.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** *Ground:* 80 - 400 L/acre. *Aerial:* 20 L/acre minimum.

Application Tips

Caution: Use Curzate 60 DF only in a tank mix with Manzate DF. Do not use Curzate 60 DF alone.

Do not apply to a potato crop that is suffering from stress as a result of drought, water saturation, low temperatures, insect infestations, nutrient deficiency or any other factors contributing to a reduction in crop growth.

How it Works

The active ingredient compound in Curzate 60 DF is a highly active, locally systemic fungicide recommended for the control of late blight on potatoes. It works as a preventative, curative and inhibitive (against sporulation) product. Curzate offers a unique feature for late blight management called "kick-back" activity. It controls infections that have already attacked the crop but are not yet visible.

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Curzate 60 DF (cont'd)

Restrictions

Rainfall: Curzate is rainfast within 2 hours after application. **Pre-harvest Intervals**: Do not harvest within 8 days of treatment. **Re-entry**: Do not re-enter treated area within 24 hours.

Environmental Precautions

Overspray or drift to sensitive habitats must be avoided. For tank mixes, consult the labels of the tank mix partners and observe the largest (most) restrictive buffer zone. Do not contaminate sensitive habitats when cleaning and rinsing spray equipment and containers. Do not mix, load or apply within 15 metres of all wells. **Runoff**: Do not apply product during periods of intense rainfall or to soils saturated with water. Do not apply directly to standing or running water. Do not apply in areas where surface water from treatment site can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation waters or wells. Do not contaminate any body of water, including irrigation water.

Toxicity

Oral LD_{50} (rats) = 433 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store product in original container in a secure, dry area away from food or feed.

Delaro 325 SC

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Delaro 325 SC (PCP# 31436)	Bayer CropScience	Prothioconazole: 175 g/L Trifloxystrobin: 150 g/L	Suspension concentrate	7.1 L

Crops, Diseases Controlled and Rates

Crops	Diseases	Rate per acre	Staging and specific comments
Dry peas	Mycosphaerella blight (*Mycosphaerella pinodes*), ascochyta blight (*Ascochyta pisi*), white mold (*Sclerotinia sclerotiorum*), grey mold (*Botrytis cinerea*)	356 mL	Begin fungicide applications at first sign of disease. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Use shorter intervals for best protection.
Chickpeas	Ascochyta blight (*Ascochyta rabiei*), white mold (*Sclerotinia sclerotiorum*), grey mold, (*Botrytis cinerea*)	356 mL	Begin fungicide applications at first sign of disease. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Use shorter intervals for best protection.
Lentils	Ascochyta blight (*Ascochyta lentis*), white mold (*Sclerotinia sclerotiorum*), grey mold (*Botrytis cinerea*), anthracnose (*Colletotrichum truncatum*)		
Soy beans	Asian soybean rust (*Phakopsora pachyrhizi*), frog eye leaf spot (*Cercospora sojina*), brown spot (*Septoria glycines*), charcoal rot (suppression) (*Macrophomina phaseolina*), phomopsis stem blight (*Phomopsis longicolla*), white mold (suppression) (*Sclerotinia sclerotiorum*)	229 mL	Begin fungicide applications preventatively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. The use of a non-ionic surfactant at 0.125%v/v may be used.

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Registered Tank Mixes

Bayer CropScience supports the following mixes that are not on the Delaro label. Apply mixes according to the most restrictive use limitations for either product. Insecticides: Decis, Lorsban, Matador.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 40 L/acre minimum. Aerial: 20 L/acre minimum.

Application Tips

Use sufficient water volume and spray pressure to provide thorough, uniform coverage for optimum disease control. Do not apply more than 2 applications of Delaro 325 SC fungicide per season. Alternate with a fungicide with a different mode of action registered for the same use(s) after each application. If an alternative fungicide is not registered for the use, only one application should be applied.

How it Works

Delaro 325 SC is a broad spectrum systemic fungicide for the control and suppression of certain crop diseases.

Restrictions

Pre-harvest Intervals: Do not apply within 30 days of harvest for dry peas, chickpeas and lentils. Do not apply within 20 days of harvest for soybeans. **Grazing:** Do not apply within 7 days of cutting or swathing of dry peas, chickpeas or lentils. **Re-entry**: Do not re-enter treated fields until 24 hours post-application. **Re-cropping**: Treated areas may be replanted with any crop specified on this label, including corn, cereals and sugar beet, as soon as practical after the last application. For crops not listed on this label, do not plant back within 30 days of last application.

Environmental Precautions

Delaro 325 SC is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified in the label. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment washwaters.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store in original container. Do not store at temperatures below freezing. If stored for 1 year or longer, shake well before using.

Dithane Rainshield™/Manzate 200/ Manzate 75DF/Manzate Pro-stick/ Penncozeb 75DF Raincoat/Penncozeb 80WP

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Dithane Rainshield™ (PCP# 29221)	Dow AgroSciences	Mancozeb: 75%	Dry flowable	20 kg
Manzate 200 (PCP# 10526)	United Phosphorus Inc.	Mancozeb: 80%	Wettable Powder	
Manzate DF (PCP# 21057)		Mancozeb: 75%	Dry Flowable	
Manzate Pro-stick (PCP# 28217)		Mancozeb: 75%	Dry Flowable	
Penncozeb 75 DF Raincoat (PCP# 30241)		Mancozeb: 75%	Dry Flowable	
Penncozeb 80 WP (PCP# 25396)		Mancozeb: 80%	Wettable Powder	

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Dithane Rainshield™/Manzate 200/Manzate 75DF/Manzate Pro-stick/ Penncozeb 75DF Raincoat/Penncozeb 80WP (cont'd)

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases controlled	Rate	Staging and specific comments
Alfalfa (for seed) (Dithane Rainshield™, Manzate 75DF, Manzate Pro-stick, Pencozeb 75DF Raincoat only)	Leaf spot and stem spot disease (*Pseudopeziza medicaginis*)	0.59 kg/acre	Apply prior to 50% bloom. Maximum of 3 applications per year.
Lentils (Dithane Rainshield™, Manzate DF, Manzate Pro-stick, Pencozeb 75DF Raincoat only)	Anthracnose (*Colletotrichum truncatum*), ascochyta blight (*Ascochyta* sp.)	0.91 kg/acre	Apply the first application before flower when bud formation is evident. A second application should be applied 10 - 12 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease persist, a third application may be applied 10 - 14 days later. Do not make more than 3 applications during the growing season.
Potatoes (All mancozeb-based products except Manzate 200)	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.44 - 0.91 kg/ acre	Apply when plants are 10 - 15 cm tall; repeat at 7 - 10 day intervals.
Potatoes (Manzate 200 only)		1 kg per 100 kg of seed	Apply to thoroughly coat the surface of whole or cut seed pieces. If treated whole seed is cut, make a second application to protect the cut surface.
Sugar beet (Dithane Rainshield™, Manzate DF, Manzate Pro-Stick, Penncozeb 75 DF Raincoat, Pencozeb 80 WP only)	Cercospora leaf spot (*Cercospora beticola*)	0.91 kg/acre	Apply when disease first threatens and repeat at 7 - 10 day intervals.
Wheat (All mancozeb-based products)	Leaf rust (*Puccinia recondita*), septoria leaf blotch (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*)	Early spray: 0.45 kg/acre Late spray: 0.91 kg/acre	An early application can be made when the crop is in the 3 leaf to tillering stage and/or a late application can be made when the head is fully emerged but prior to flowering. Do not make more than 2 applications during the growing season.

Registered Tank Mixes

Tank mix partner	Tank mix rate	Diseases controlled	Specific comments
Potatoes			
Kocide 2000	Manzate Pro-stick or Manzate DF at 0.44 - 0.91 kg/acre PLUS Kocide 2000 at 0.32 - 0.64 kg/acre.	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	Apply at 7 - 10 days intervals starting when plants are 15 cm high until harvest.
Curzate 60 DF	Manzate Pro-stick or Manzate DF at 0.44 - 0.91 kg/acre PLUS Curazate at 0.09 kg/acre.	Late blight (*Phytophthora infestans*)	Initial applications should start when local conditions indicate that late blight is imminent. Apply no more than 7 applications per crop.

Application Information

How to Apply: Ground and aerial application. Do not apply to sugar beet by air. **Water Volume**: Utilize sufficient water to obtain thorough coverage. See label for information on water volumes for specific crops.

Application Tips

Do not apply to a potato crop that is suffering from stress or any other factors contributing to a reduction in crop growth. Do not apply product during periods of intense rainfall or to soils saturated with water.

How it Works

A contact fungicide.

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Restrictions

Grazing: Do not graze the treated crop or cut for hay. Do not use on alfalfa sprout crops for human consumption. Do not use seed crop residue for animal consumption. **Pre-harvest Intervals (Days)**: Lentils - 35; potatoes - 1; sugar beet - 21; wheat - 40.

Environmental Precautions

All Mancozeb-based products are toxic to fish. Do not apply when weather conditions favor drift from areas treated. Do not apply directly to water or to areas where surface water is present. Do not contaminate water by disposing of equipment washwater.

Toxicity

Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 - 5,000 mg/kg.

Storage

Store in a cool, dry, ventilated place away from fire and sparks.

Elatus

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Elatus A (PCP# 31973)	Syngenta	Azoxystrobin: 250 g/L	Suspension	8.1 L
Elatus B (PCP# 31977)		Benzovindiflupyr: 100 g/L	Emulsifiable concentrate	8.1 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases controlled	Rate	Staging and specific comments
Field peas	Aschochyta blight (*Aschochyta* spp.), Mycosphaerella blight, (*Mycosphaerella pinodes*), powdery mildew (*Microsphaera diffusa, Erysiphe pisi, E. polygoni*)	Elatus A: 200 ml/ac Elatus B: 200 ml/ac	For Aschoyta/Mcyosphaerella, the first application must be before disease is established and no later than the onset of flowering. A second application can be made 10 - 14 days after the first application, when the disease pressure is high or weather conditions are conducive to disease development or movement. For powdery mildew, make the first application at 5% infection, followed by a second application 10 days later if conditions are favourable for disease development.
Chickpea, lentil	Aschochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella* spp.), Anthracnose (*Collectotrichum* spp.)	Elatus A: 200 ml/ac Elatus B: 200 ml/ac	The first application must be before disease is established and no later than the onset of flowering. A second application can be made 10 - 14 days after the first application, when the disease pressure is high or weather conditions are conducive to disease development.

Application Information

How to Apply: Ground and aerial application. Water volume: Ground: 40 L/acre minimum. Aerial: 20 L/acre.

Application Tips

Use sufficient water volume to provide uniform coverage. Do not apply more than two applications of Elatus per season.

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Elatus (cont'd)

How it Works

Elatus is a broad-spectrum product containing two fungicides. It has preventive and systemic properties and is recommended for the control of many important diseases.

Restrictions

Rainfall: Rainfast 2 hours after application. **Pre-harvest Interval**: 15 days. **Re-entry**: Do not enter treated fields for 12 hours after application. **Grazing**: Do not feed dried pea vines to livestock. **Re-cropping**: Potatoes and tuberous and corm vegetables subgroup, dried shelled peas and beans, soybeans, fruiting vegetables crop group, cucurbit vegetables, cereals (wheat, barley, oats, rye, triticale), corn (sweet, pop and specialty), rapeseed subgroup and all crops registered for use with azoxystrobin have no (0 days) re-cropping restrictions. All other crops intended for food or feed have a 180-day re-cropping restriction.

Environmental Precautions

Toxic to aquatic organisms. Observe a buffer zone of 1 m around freshwater habitats. Benzovindiflupyr and azoxystrobin are persistent, and it is recommended that they are not used in areas treated with these products in the previous season.

Toxicity

Azoxystrobin: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.
Benzovindiflupyr: Oral LD_{50} (rats) = 550 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Keep in original container. Store in a cool, dry, well ventilated area. Do not store below 0°C .

Evito

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Evito (PCP# 30408)	Arysta LifeScience	Fluoxastrobin: 480 g/L	Suspension concentrate	4.8 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Wheat	Leaf rust (*Puccinia triticinia*), stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*, tan spot (*Pyrenophora tritici-repentis*)	59 - 118 mL	Apply preventatively and repeat if needed after 14 - 21 day intervals. Use higher rates and shorter intervals when disease pressure is high. Ideal timing is at Feekes 9 (flag leaf), prior to disease development. Applications can be made between Feekes 5 and 10.5 (late head emergence).
	Powdery mildew (*Erysiphe graminis*)	74 - 118 mL	
	Septoria leaf blotch (*Septoria tritici*) suppression	59 - 118 mL	
Barley	Leaf rust (*Puccinia triticinia*), strip rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*, net blotch (*Pyrenophera teres*)	59 - 118 mL	

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Crops	Diseases controlled	Rate per acre	Staging and specific comments
Corn	Common rust (*Puccinia sorghi*), Southern corn leaf blight (*Cochliobolus heterostrophus*)	59 - 120 mL	Apply preventatively and repeat if needed after 7 - 10 day intervals. Use higher rates and shorter intervals when disease pressure is high.
	Northern corn leaf blight (*Setosphaeria turcica*, anamorph: *Exserohilum turcicum*) suppression		
Soybean	Frogeye leaf spot (*Cercospora sojina*)	59 - 120 mL	Apply preventatively and repeat if needed after an interval of 14 - 21 days. Use higher rates and shorter intervals when disease pressure is high. Do not apply later than R6 (full seed).
Potato	Late blight (*Phytophthora infestans*) suppression	112 mL	Apply preventatively and repeat on a 7 day interval. If disease symptoms develop, switch to a fungicide with a different mode of action.
	Black scurf (*Rhizoctonia solani*)	1.55 - 2.33 mL product/100 m row	Apply as an in-furrow application or banded application shortly after plant emergence, during herbicide application or cultivation.

Registered Tank Mixes

Wheat and barley: propiconazole, tebuconazole. Catamba, Proline 480 SC, Prosaro 250 EC.

Corn: propiconazole (field, seed, sweet), chlorothalonil (sweet corn only).

Soybean: propiconazole and tebuconazole.

Potato: chlorothalonil and mancozeb.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: Minimum of 80 L/acre. Aerial: 20 L/acre.

Application Tips

Good coverage is essential for effective disease control; use sufficient water to ensure thorough coverage of plants.

How it Works

Evito 480SC Fungicide is a systemic fungicide that works by interfering with respiration in plant pathogenic fungi and is an inhibitor of spore germination and mycelial growth.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Pre-harvest Intervals**: Cereals: do not apply within 7 days of harvest for hay and forage or within 40 days of harvest for grain. Corn: do not apply within 7 days of harvest of sweet corn or within 30 days of harvest for grain corn. Soybean: do not apply beyond R6 (full seed). Potato: do not apply within 7 days of harvest. **Re-entry**: Do not re-enter treated areas for at least 12 hours.

Environmental Precautions

Toxic to aquatic organisms. Observe buffer zones as specified on the label. To reduce runoff from treated area into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in cool, dry place. Do not freeze.

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Exemplа

[redacted] Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Exemplа (PCP# 32915)	Syngenta	Azoxystrobin 125 g/L Difenoconazole 125 g/L	Suspension	4 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	229 mL	Apply at 20 - 50% bloom stage. This staging will suppress alternaria black spot. For optimum efficacy, use the recommended water volumes to ensure good coverage.
Canola, mustard seed	Alternaria black spot (*Alternaria brassicae*) (*Alternaria raphani*)	229 mL	For control make an application at the pod stage (50% petal drop). For optimum efficacy, use the recommended water volumes to ensure good coverage.
	Virulent blackleg (*Leptosphaeria maculans*)	129 - 229 mL	Make an application during the rosette stage between the 2nd true leaf and bolting, with 2 - 6 leaf as optimal. Apply higher rate under condition of high disease pressure. For optimum efficacy, use the recommended water volumes to ensure good coverage. ADDED DD TANK MIXTURES: Apply specified rate in 10 - 40 L/acre of water.

Registered Tank Mixes

Consult manufacturer for supported tank mixes.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 45 - 70 L/acre. Air: 18 L/acre minimum.

Application Tips

Use recommended water volumes to ensure good coverage. Do not apply more than one application of Exemplа in a season. Do not apply at rates lower than recommended on the label. Do not apply more than 50 g active ingredient/acre of difenoconazole or 200 g active ingredient/acre of azoxystrobin in one season.

How It Works

Exemplа works systemically and on contact to provide both preventative and curative protection to the plant.

Restrictions

Rainfall: Product may be applied within 2 hours of rainfall. **Pre-harvest Interval:** Do not apply within 30 days of harvest. **Grazing:** No feeding restrictions **Re-cropping:** Do not plant any other crop for a period of 60 days following Exemplа application unless difenoconazole is registered for that crop.

Environmental Precautions

The product is toxic to aquatic organisms, mammals and non-target terrestrial plants. Consult label for buffer zones and other environmental management techniques to reduce off-site movement of the product. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) > 500 mg/kg.

Storage

Store in a cool, dry place. Product may be frozen. Allow to thaw completely prior to use. Shake well or otherwise agitate thoroughly prior to use.

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Folicur 250 EW/Palliser/Fuse

Group 3

Formulations

Product	Company	Active ingredient	Formulation	Container size
Folicur 250 EW (PVP 4804)	Bayer CropScience	Tebuconazole 250 g/L	Emulsion in water	4 x 5 L
Palliser (PVP 6955)	Loveland Canada Products Inc.	Tebuconazole 432 g/L	Suspension	4 x 5L, 208 L
Fuse (PVP 6956)	Syngenta	Tebuconazole 432 g/L	Suspension	4 x 5 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre		Staging
		Folicur 250 EW	Palliser/Fuse †	
Wheat	Suppression of fusarium head blight (*Fusarium graminearum*), control of septoria glume blotch (*Stagonospora nodorum*)	410 mL	1.16 mL	Timing of application is critical. Apply within the time period from when at least 10% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.
	Rusts (leaf, stem and stripe) (*Puccinia triticina*, *P. graminis*, *P. striiformis*), septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora tritici-repentis*)	4.0 - 205 mL	86 - 116 mL	Apply in leaf tillage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage.
	Powdery mildew (*Erysiphe graminis*)	205 mL	1.16 mL	
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), rusts (leaf, stem and stripe), septoria leaf blotch (*Septoria passerinii*), powdery mildew (*Erysiphe graminis*)	4.0 - 205 mL	86 - 116 mL	Apply at the very early stage of disease development. Use the higher rate when weather conditions are conducive to heavy disease development.
Oats	Crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*)	4.0 mL	86 mL	Apply at the very early stage of disease development.
Soybeans	Asian soybean rust (*Phakopsora pachyrhizi*), frogeye leaf spot (*Cercospora sojina*), powdery mildew (*Microsphaera diffusa*)	4.0 - 102 mL	86*	Apply when the first symptoms of disease can be found or when the risk of infection is increased.

† Not registered

Registered Tank Mixes

Folicur 250 EW/Palliser/Fuse can be tank mixed with certain products for control of early season leaf diseases, weeds and insects. Refer to label for registered herbicide products.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 40 L/acre minimum. Aerial: 20 L/acre.

Application Tips

Spray coverage is essential. Ensure thorough coverage of all wheat heads for optimal suppression of *Fusarium* head blight. Always use a non-ionic surfactant with Palliser and Fuse such as Agral 90 or Agridex at 0.125% (v/v).

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Fertilizer Grid #1 Fertilizer Prices (cont'd)

Area 4 Stocks

Tetrachloride is a broad-spectrum fungicide for disease control on a couple crops grown in Area 4. Stocks are adequate.

Restrictions

Dicamba: Do not allow livestock or grazing on treated areas forage or for cereal grain 21 days after application. Some use sites have use limitations. Do not use for feeding. Pre-Harvest Interval: Do not apply within 14 days of harvest for cotton, barley, and oats. Do not apply within 21 days of harvest for sorghum, and wheat. Do not cross-graze treated fields for 21 days after application. Restricted Entry Interval: 4 hours after application is complete. Re-cropping: Treated areas may be replanted following harvest with corn, soy, cereal or dry beans. Do not replant treated areas for 120 days after last application for crops not listed on the label.

Environmental Precautions

Tetrachloride is toxic to birds, small wild animals, aquatic organisms and pollinating insects. Do not apply directly to water or to areas where surface water is present. Do not contaminate irrigation or drinking water supplies or aquatic habitat by cleaning of equipment or disposal of wastes. Do not apply by ground to the extent of harmful effects to aquatic organisms.

Toxicity

Oral LD$_{50}$ rates = 1,710 mg/kg

Storage

Store in a cool, dry place and prevent cross contamination with other pesticides, fertilizers, food, and feed.

Fontelis

Image 17

Formulations

Product	Company	Active Ingredient	Usage Rate	Restrictions
Fontelis 20 FW 4MAG	U.S. AgTech Canada	Penthiopyrad, 200 g/L	0.5 L/A	21 PHI

Crops, Diseases Controlled and Rates

Crop	Diseases Controlled	Rate per acre	Staging and Specific Instructions
Canola	Sclerotinia stem rot, Alternaria subnodulorum	0.5L - 1.0L/A	Make applications prior to flowering, but before petals fall. 7 day interval. Max 2 applications per crop. Limited spray. Water volume 1-2 gpa.

Registered Tank Mixes

None registered.

Application Information

Use as foliar. Ground and aerial applications. Water Volume: Ground: 10 L/acre. Aerial: 10 L/acre min.

Application Tips

Use sufficient water to ensure thorough coverage of plants. Do not apply under periods of drought stress. Avoid application of this product when winds are gusty.

Area 4 Stocks

The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and translaminar properties recommended for foliar and soil-borne plant diseases.

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Quarantine

Quarantine (noun) — A location or other application where **Quarantining** (the act) takes place.
Quarantine Object (noun) — A data or **file** object that is placed in a quarantine.
Quarantining (verb) — The act of placing a file or other object into a quarantine.

Environmental Precautions

Environmental Precautions (noun) — Actions taken to reduce the risk of harm to the environment.

Safety

Safety (noun) — The state of being safe.

Damage

Damage (noun) — The act of causing harm to something.

Pollution

Pollution (noun) — The introduction of harmful substances into the environment.

Pollutants

Pollutant	Primary Source	Environmental Impact	Human Health Impact	Mitigation Strategy
Carbon dioxide (CO_2)	Combustion of fossil fuels	Contributes to global warming	Indirectly affects health through climate change	Reduce fossil fuel consumption

Types, Sources, Controls, and Laws

Type	Primary Sources	Key Pollutants	Control Technologies / Practices
Air pollution	Fossil fuel combustion (transportation, industry)	CO_2, NO_x, SO_2	Catalytic converters, scrubbers, cap-and-trade programs
	Biomass burning and agricultural activities	CO, NO_x, $PM_{2.5}$	Crop residue management, controlled burning practices

Background and Early History

The Clean Air Act was first passed in 1963 and has been amended several times since.

Specification Information

Who to Apply — Generally applies to any person who **Engages in Pollution** that causes environmental harm.

Specification Type

Each exchange is recorded in an electronic database, which can be queried to retrieve information about specific exchanges.

Gavel 75 DF

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[

Headline EC (cont'd)

Crops	Diseases	Rate per acre	Staging
Dried and succulent shelled peas, lentils and beans			
Dry beans (Phaseolus, Vigna and Lupinus spp.)	Anthracnose (*Colletotrichum* spp.), mycosphaerella blight (*Mycosphaerella* spp.), powdery mildew (*Erysiphe* spp.), rust (*Uromyces* spp.)	0.10 L	Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (e.g. anthracnose or white). Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favorable for disease development.
Dry peas (field), faba beans	Mycosphaerella blight (*Mycosphaerella* spp.), powdery mildew (*Erysiphe* spp.)	0.10 L	
	Asian soybean rust (*Phakopsora pachyrhizi*)	0.10 - 0.29 L	
Lentil	Anthracnose (*Colletotrichum truncatum*), Ascochyta blight (*Ascochyta* spp.)	0.10 L	
Succulent beans and peas (Phaseolus, Vigna and Pisum spp.)	Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella* spp.), rust (*Uromyces* spp.), Asian soybean rust (*Phakopsora pachyrhizi*)	0.10 - 0.29 L	
Field crops			
Chickpea	Ascochyta blight (*Ascochyta* spp.)	**Note:** HEADLINE EC must be tank mixed at a rate of 0.10 - 0.29 L/acre with Lance WDG at 0.10 - 0.17 L/acre.	
Fruit, vegetables; tuberous and corm vegetables subgroup			
Figs	Freeze (*Diplocarpon mespili*)	0.10 - 0.19 L	
Soybeans	Asian soybean rust (*Phakopsora pachyrhizi*), frog eye leaf spot (*Cercospora sojina*)	0.10 - 0.29 L	
Sugar beets	Cercospora leaf spot, (*Cercospora beticola*), powdery mildew (*Erysiphe polygoni*)	0.27 - 0.39 L	
Fruiting vegetables, except cucurbits			
Watermelons, muskmelons, pumpkins	Leaf and stem rust (*Puccinia recondita, P. graminis*), powdery mildew (suppression) (*Erysiphe graminis*)	0.10 - 0.27 L	Apply prior to disease development and apply a second time 14-21 days later with a fungicide that contains a different mode of action if disease persists. Use the higher rate and shorter interval when disease pressure is high.
Alfalfa	Common leaf spot (*Pseudopeziza medicaginis*)	0.10 L	Apply at beginning of flowering (10 - 20% bloom) or the onset of disease. Maximum 1 application per year.
Potatoes			
Potato	Early blight (*Alternaria solani*) (spray interval 7-10 days)	0.10 - 0.27 L	Apply prior to row closure or when conditions become favorable for the development of disease. Do not make more than 1 application before alternating to an effective fungicide with a different mode of action for at least one application. Do not make more than 3 applications per season.
	Late blight (*Phytophthora infestans*) (spray interval 5-7 days)	0.10 - 0.27 L	
	Late blight (*Phytophthora infestans*) (spray interval 7-10 days)	0.10 - 0.27 L	In a tank mix with Bravo 500 or Polyram DF.

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Crops	Diseases	Rate per acre	Staging
Oilseeds			
Rapeseed, canola, canola quality *Brassica juncea*, mustard (oilseed and condiment)	Black spot (*Alternaria brassicae* and *A. raphani*)	0.12 - 0.16 L	Apply at 20-50% bloom for suppression to early pod stage (10% bloom) for control in canola.
	Black leg (*Leptosphaeria maculans*)	0.12 - 0.16 L	Apply at the 2-6 leaf stage.
Sunflower	Rust (suppression) (*Puccinia helianthi*)	0.12 - 0.16 L	For optimal disease suppression, apply prior to disease development.

Registered Tank Mixes*

Tank mix partner	Crops registered
Lance WDG	Canola, chickpea
Odyssey WDG	CLEARFIELD canola, CLEARFIELD XCEED
Odyssey DLX	CLEARFIELD canola
Equinox	All canola varieties, CLEARFIELD XCEED
Pursuit Ultra	All canola varieties
Liberty 150 SN, Liberty 200 SN	LibertyLink canola
Registered glyphosate products	Glyphosate tolerant canola
Strum 500	Potatoes
Poltrum 37	Potatoes

*Note: Consult the label of the tank mix partner for diseases/weeds controlled, rates and timing of applications.

Application Information

How to Apply: Ground sprayers, aerial application or by pivot or sprinkler irrigation. Do not apply registered tank mixes listed above to potato, chickpea and canola with pivot or sprinkler irrigation. **Water Volume:** Ground: 40 L/acre minimum except for potatoes and sugar beet where 80 L/acre minimum is recommended. Aerial: 20 L/acre minimum. Do not apply more than 0.16 L/acre of Headline EC by aerial application. Chemigation: application must be made without the use of end guns.

Application Tips

Good coverage is essential for effective disease control and higher water volumes tend to increase performance with dense canopies. Headline EC works best if it is applied in a preventative manner and performs best if applied in a regularly scheduled protective spray program. Do not apply more than 1 application of this product before alternating to a fungicide with an alternative mode of action.

How It Works

Headline EC has a protective effect because it inhibits spore germination and a curative effect due to the inhibition of mycelial growth and sporulation of the fungus on the leaf surface. Headline is systemic within the leaf. Headline applied to the top surface of the leaf binds tightly in the waxy cuticle and also moves to the lower surface where it provides dual-sided protection against disease entry.

Restrictions

Rainfast: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing**: Do not graze treated corn crops within 6 days of application. Do not feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock. **Pre-harvest Interval**: Cereals - apply no later than the end of flowering. Corn - 7 days. Edible-podded legumes and succulent beans and peas - 7 days. Grasses (grown for seed) - 14 days. Potatoes - 3 days. Dry bean and field peas, fababeans, and lentils - 30 days. Soybeans, canola, canola quality *Brassica juncea*, mustard (oilseed and condiment), rapeseed - 21 days. Sugar beets - 7 days. **Re-cropping**: A plant-back restriction of 14 days is required for all crops not on the label.

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Headline EC (cont'd)

Environmental Precautions
Headline EC is toxic to aquatic organisms, non-target terrestrial plants and small mammals. Observe buffer zones specified on the label. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Toxicity
Oral LD_{50} (rats) = 500 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage
Store in a cool, dry, locked, well ventilated area without floor drain.

Kumulus DF

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Kumulus DF (PCP# 18836)	BASF Canada	Sulphur: 80%	Water dispersible granules	25 kg

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Field Peas	Powdery mildew (*Erysiphe pisi*)	0.6 kg	Spray at first appearance of disease and repeat at 7 - 10 day intervals as necessary.

Registered Tank Mixes
Kumulus DF is compatible with Polyram DF. Do not mix with dinitro compounds, tetradifon or oils.

Application Information
How to Apply: Ground application only. Do not apply by air. **Water Volume**: 40 L/acre minimum.

Application Tips
Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails or if any of the above conditions are expected within 3 days after the treatment. Do not apply under intense sunshine. Do not apply when weather favours drift. Do not use within 30 days of an oil spray.

How it Works
A contact and protectant fungicide.

Restrictions
Pre-harvest Intervals: Do not apply later than 1 day before harvest.

Environmental Precautions
Do not apply directly to aquatic habitats. Avoid drift onto neighboring crops.

Toxicity
Oral LD_{50} = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in cool, dry, well ventilated locked area without a floor drain.

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Lance AG

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lance AG (PCP# 27495 and PCP# 27322)	BASF Canada	Boscalid: 70%	Wettable granules	3.5 kg Lance AG (A)
		Pyraclostrobin: 250 g/L	Emulsifiable concentrate	3.3 L Lance AG (B)

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Alfalfa (seed production only)	Blossom blight (*Sclerotinia Botrytis cinerea sclerotiorum*), common leaf spot (*Pseudopeziza medicaginis*), spring black stem (*Phoma medicagnis*), leaf spot (*Leptosphaerulina briosiani*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at 10 - 30% bloom or at the onset of symptoms. If disease persists or weather conditions are favourable for disease development, apply a second application 10 - 14 days later with a fungicide that contains a different mode of action.
Canola, mustard (oilseed and condiment)	Sclerotinia stem rot (*Sclerotinia sclerotiorum*), black spot (*Alternaria brassicae* and *raphani*)	140 g Lance AG (A) and 132 mL Lance AG (B)	Apply at 20 - 50% flowering to control sclerotinia stem rot and suppress black spot. For control of alternaria black spot, apply at late flowering to the early green pod stage. Do not make more than 2 applications per season.
Chickpea and lentil	Anthracnose (*Colletotrichum truncatum*), Ascochyta blight (*Ascochyta lentis*), white mold (*Sclerotinia sclerotiorum*), grey mold (*Botrytis cinerea*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two-pass application for lentils, product should be sprayed as a second pass 10 - 14 days after first application.
Peas (dry)	Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella pinodes*), grey mold (*Botrytis cinerea*), powdery mildew (*Erysiphe* spp.). Suppression of downy mildew (*Peronospora viciae*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two-pass application, product should be sprayed as a second pass 10 - 14 days after first application.

Application Information

How to apply: Ground and aerial application. Ground: Alfalfa, canola, chickpea, dry peas, lentil. Aerial: Alfalfa, canola, chickpea, lentil. **Water Volume**: Ground: 40 L/acre minimum. Aerial: 20 L/acre minimum.

Application Tips

Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

How it Works

The active ingredient boscalid is a carboximide (SDHI) fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad-spectrum fungicide

Restrictions

Rainfall: Do not apply if rain is likely to occur within 3 hours of spraying. Avoid irrigation for 24 hours after application. **Grazing**: For alfalfa grown for seed production: do not graze or feed treated hay to livestock. All other crops on label can be grazed or fed to livestock. **Pre-harvest Intervals**: chickpea, lentil, peas – 30 days; canola, mustard – 21 days. Alfalfa grown for seed: not applicable. **Re-entry**: Do not re-enter treated area for 12 hours after application or until dry. **Re-cropping**: Labelled crops can be planted immediately following application. All other crops not on the label can be planted 14 days after the last application.

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Environmental Precautions

Lance AG is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. **Runoff**: Do not apply to areas where runoff is likely to occur. Boscalid is persistent and will carry over; it is recommended that Lance AG not be used in areas treated with this product during the previous season.

Toxicity

Oral LD_{50} (male/female rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in original container in a cool, dry area. Do not ship or store near food, feed, seed and fertilizers.

Lance WDG

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lance WDG (PCP# 27495)	BASF Canada	Boscalid: 70%	Wettable granules	2.83 kg

Crops, Diseases Controlled, Rates and Timing

Crop	Diseases	Rate per acre	Staging and specific comments
Field crops			
Alfalfa (seed production only)	Blossom blight (*Sclerotinia Botrytis cinerea sclerotiorum*), common leaf spot (*Pseudopeziza medicaginis*), spring black stem (*Phoma medicagnis*), leaf spot (*Leptosphaerulina briosiani)*	170 g	Apply at 20 - 50% flowering to control blossom blight, common leaf spot and spring black stem. Apply every 7 - 14 days if disease persists or weather conditions are favourable for disease development. Do not make more than 3 applications per season.
Canola, mustard (oilseed and condiment), CLEARFIELD XCEED	Sclerotinia stem rot (*Sclerotinia sclerotiorum*), black spot (*Alternaria brassicae* and *raphani)*	142 g	Apply at 20 - 50% flowering to control sclerotinia stem rot and suppress black spot. Apply a second time 7 - 14 days later up to full bloom if disease persists or weather conditions are favourable for disease development. For control of alternaria black spot, apply at late flowering to the early green pod stage. Do not make more than 2 applications per season.
Chickpea and lentils	Ascochyta blight** (*Ascochyta* spp.), gray mold (*Botrytis cinerea*), white mold (*Sclerotinia sclerotiorum*)	170 g	Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Do not make more than 2 applications per season.
Dry beans, faba beans	White mold (*Sclerotinia sclerotiorum*)	227 - 312 g	Apply at 20 - 50% flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Use the higher rate to obtain extended protection and maximum yield benefit. Do not make more than 2 applications per season.

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Crop	Diseases	Rate per acre	Staging and specific comments
Peas (dry)	Ascochyta blight (*Ascochyta* spp.) gray mold (*Botrytis cinerea*), Mycosphaerella blight (*Mycosphaerella* spp.)	170 g	Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Do not make more than 2 applications per season.
Potatoes	Early blight (*Alternaria solani*)	70 - 126 g	Apply prior to disease development and at 14 days intervals. Do not make more than 4 applications per season.
	Late blight (*Phytophthora infestans*)	70 - 126 g	Lance must be tank mixed with either Polyram DF or Bravo 500 at label rates for control of late blight. Apply prior to disease development.
Sunflowers	Suppression of Sclerotinia head rot (*Sclerotinia sclerotiorum*), suppression of leaf spot (*Alternaria helianthi*)	142 - 259 g	For optimal disease suppression, apply at early flower. Use the higher rate and shorter interval when disease pressure is high or there is a history of disease in the field. One application per season.

** For the control of ascochyta blight in chickpea, Lance should be mixed with 160 to 240 mL/acre Headline EC.

Application Information

How to Apply: Ground and aerial application. Ground: Alfalfa, canola, chickpeas, dry beans, faba beans, dry peas, lentils, potatoes. Aerial: Alfalfa, dry beans, faba beans, canola, chickpeas, lentils, potatoes. **Pivot or sprinkler irrigation:** Alfalfa, canola, dry beans, fababeans, potatoes. **Water Volume**: Ground: 40 L/acre minimum. For pivot and sprinkler irrigation applications: Do not exceed 0.64 cm (1/4 inch) or 25,700 L/acre. Aerial: 16 L/acre minimum.

Application Tips

Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

How it Works

Lance provides a protective effect because it inhibits spore germination on plant surfaces. Optimum disease control is achieved when Lance WDG fungicide is applied in a regularly scheduled preventive spray program and is used as a protective application.

Restrictions

Rainfall: Do not apply if rain is likely to occur within 3 hours of spraying. Avoid irrigation for 24 hours after application. **Grazing**: For alfalfa grown for seed production: Do not graze or feed treated hay to livestock. All other crops on label can be grazed or fed to livestock. **Pre-harvest Intervals**: Canola, chickpeas, dry beans, fababeans, lentil, mustard (oilseed types), peas - 21 days; potatoes - 30 days; succulent beans and peas - 7 days. **Re-entry**: Do not re-enter treated area for 12 hours after application or until dry. **Re-cropping**: Labelled crops can be planted immediately following application. All other crops not on the label can be planted 14 days after the last application.

Environmental Precautions

Lance is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. **Runoff**: Do not apply to areas where runoff is likely to occur. Boscalid is persistent and will carry over; it is recommended that this product not be used in areas treated with this product during the previous season.

Toxicity

Oral LD_{50} (male/female rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in original container in a cool, dry area. Do not ship or store near food, feed, seed and fertilizers.

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Phostrol

Group 33

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Phostrol (PCP# 30449)	Engage Agro Corporation	Mono- and dibasic sodium, potassium, and ammonium phosphites: 53.6%	Liquid	10 L, 1000 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 - 4.7 L	In furrow application. Apply at planting in a band directly over the seed prior to row closure.
	Late blight (*Phytophthora infestans*)	1.2 - 4.7 L	Foliar application. Begin applications when conditions favouring disease development are present and repeat on a 7 - 14 day interval. Use the higher application rate and shorter application interval when disease pressure is moderate to high.
	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 - 4.7 L	
	Late blight (*Phytophthora infestans*)	0.42 L in 2 L water to 1 tonne potato tubers	Post-harvest control: Directly apply to tubers and ensure complete and even coverage.
	Pink rot (*Phytophthora erythroseptica*)		

Registered Tank Mixes

In furrow: Pink rot - Ridomil Gold 480SL.

Foliar: Pink rot - Ridomil Gold MZ 68WP Water Soluble Bag, Ridomil Gold MZ 68WG, Ridomil Gold Bravo Twin Pack.

Foliar: Late blight - Bravo 500, Bravo ZN, Echo 720, Echo 90DF, Ridomil Gold Bravo Twin Pack, Dithane F-45, Dithane DG 75, Dithane DG Rainshield NT, Manzate Pro-Stick, Gavel 75DF, Penncozeb 75 DF.

Application Information

How to Apply: In-furrow, ground and aerial application. **Water Volume**: In-furrow: 12 L/acre. Ground: 80 L/acre. Aerial: 20 L/acre.

Restrictions

Maximum Number of Applications: Do not exceed 7 foliar applications per year. **Grazing**: Do not graze treated fields or feed treated forage or hay to livestock. **Pre-harvest Interval**: Can be applied up to the day of harvest. **Re-entry**: Do not enter treated areas for 12 hours. **Re-cropping**: No restrictions listed.

Environmental Precautions

Do not use to treat aquatic pests. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (rats) >5,000 mg/kg. Dermal LD_{50} (rats) >5,000 mg/kg.

Storage

Store in a dry, secure and ventilated area. Keep in original container.

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Polyram DF

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Polyram DF (PCP# 30883)	BASF Canada	Metiram: 80%	Water dispersible granules	20 kg

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.45 - 0.91 kg	Apply at 7 - 10 day intervals using 0.45 - 0.71 kg/acre until plants cover the row. Then increase the rate to 0.91 kg/acre until tops are killed or use 0.45 - 0.71 kg/acre at 5 - 7 day intervals starting when plants are 15 cm high and continuing until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case. May be applied up to the day before harvest.
Sugar beets	Cercospora leaf spot (*Cercospora beticola*)	0.91 kg	Use 0.91 kg/acre when disease is noticed. Repeat at regular intervals of 7 - 10 days depending on weather conditions. Do not apply later than 21 days before harvest.

Registered Tank Mixes

None registered.

Application Information

How to Apply: *Ground application: all registered crops. Aerial applications: potato only.*
Water Volume: Ground: 40 - 80 L/acre. Aerial: 22 L/acre.

Application Tips

Complete and even crop coverage is essential for effective disease control.

How it Works

A contact and protectant fungicide.

Restrictions

Do not use treated tops for feed or food.

Environmental Precautions

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specific buffer zones should be observed.

Toxicity

Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry, ventilated place.

Priaxor

[redacted]

Formulations

Product	Company	Active ingredient	Formulation	Container size
Priaxor (PDP# 69067)	BASF Canada	Fluxapyroxad: 167 g/L Pyraclostrobin: 333 g/L	Suspension concentrate	5 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (all types including durum and winter) Triticale	Leaf rust (*Puccinia recondita*), septoria leaf spot (*Septoria nitida* or *Leptosphaeria nodorum*), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis* f. sp. *tritici*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	60 - 120 mL	Apply immediately after flag stage. Use the higher rate to obtain extended protection with maximum yield benefits. Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favourable for disease development.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	60 - 120 mL	
Corn (field, sweet, pop, seed types)	Common rust (*Puccinia sorghi*), grey leaf spot (*Cercospora zeae-maydis*), northern leaf blight (*Setosphaeria turcica*), suppression of eye spot (*Aureobasidium zeae*)	120 mL	
Oats	Crown rust (*Puccinia coronata*)	60 - 120 mL	
Rye	Leaf rust (*Puccinia recondita*), powdery mildew (*Erysiphe graminis*)	60 - 120 mL	
Dry beans (*Phaseolus*, *Vigna* and *Lupinus* spp.)	Anthracnose (*Colletotrichum* spp.), powdery mildew (*Erysiphe* spp.), rust (*Uromyces* spp.)	120 mL	Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (e.g. anthracnose or rust(s)).
Field pea (field)	Mycosphaerella blight (*Mycosphaerella* spp.), powdery mildew (*Erysiphe* spp.), fusarium wilt (*Fusarium* spp.), root rot (*Rhizoctonia solani*), suppression of downy mildew (*Peronospora viciae* f. sp. *Pisi*)	120 - 180 mL	Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists or weather conditions are favourable for disease development.
	Suppression of white mold (*Sclerotinia sclerotiorum*)	180 mL	
Faba beans	Powdery mildew (*Erysiphe* spp.), ascochyta blight (*Ascochyta* spp.), fusarium wilt (*Fusarium* spp.)	120 - 180 mL	Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists or weather conditions are favourable for disease development.
	Suppression of white mold (*Sclerotinia sclerotiorum*) and grey mold (*Botrytis cinerea*)	180 mL	

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Crop	Diseases	Rate per acre	Timing and specific comments
Leeks	Anthracnose (Colletotrichum coccodes), alternaria blight (Alternaria spp.)	1.0 - 1.65 oz.	Apply a second time 7 - 10 days later with a fungicide that contains a different mode of action if disease symptoms or weather conditions are favorable for disease development.
	Suppression of white mold (Sclerotinia sclerotiorum) and gray mold (Botrytis cinerea)	1.65 oz.	
Specialties: beans and peas (Phaseolus, Vigna and Pisum spp.)	Powdery mildew (Erysiphe spp.), alternaria blight (Alternaria spp.), cercosporella blight (Mycosphaerella spp.), rust (Uromyces spp.), black nodular rot (Phakopsora pachyrhizi)	1.0 - 1.65 oz.	
	Suppression of white mold (Sclerotinia sclerotiorum) and gray mold (Botrytis cinerea)	1.65 oz.	
Lima beans	Alternaria blight (Alternaria spp.)	1.0 - 1.65 oz.	Apply at the onset of symptoms for this more aggressive disease. Apply a second time 7 - 10 days later with a fungicide that contains a different mode of action if disease symptoms or weather conditions are favorable for disease development.
	Suppression of white mold (Sclerotinia sclerotiorum) and gray mold (Botrytis cinerea)	1.65 oz.	
Peas	Powdery mildew (Erysiphe cichoracearum)	1.0 - 1.65 oz.	Apply at the onset of disease or 7 - 14 days following first freeze for optimal efficacy.
	Suppression of white mold (Sclerotinia sclerotiorum)	1.65 oz.	
Soybeans	Asian soybean rust (phakopsora pachyrhizi), frog eye leaf spot (Cercospora sojina) and septoria brown spot (Septoria glycines)	1.0 - 1.65 oz.	Apply at the onset of disease or first freeze for optimal efficacy.
	Suppression of white mold (Sclerotinia sclerotiorum)	1.65 oz.	
Sugar beets	Cercospora leaf spot (Cercospora beticola), powdery mildew (Erysiphe polygoni)	1.65 oz.	
Ginseng (see Specialty vegetables, seed production)	Leaf and stem rust (Puccinia coronata), P. graminis, suppression of powdery mildew (Erysiphe graminis)	1.0 - 1.65 oz.	Apply prior to disease development and apply a second time 7 - 21 days later with a fungicide that contains a different mode of action if disease persists. Use the higher rate and shorter interval when disease pressure is high.
Alfalfa (seed production only)	Common leaf spot (Pseudopeziza medicaginis)	1.65 oz.	Apply at beginning of flowering (1 - 10% bloom) or first onset of disease. Maximum 1 application per year.
	Suppression of Sclerotinia blight (Sclerotinia sclerotiorum)	1.65 oz.	
Rapeseed, canola, canola quality (Brassica juncea, napus and rapa) (oilseed and sunflowers)	Black spot (Alternaria brassicae and A. raphani)	1.0 - 1.65 oz.	Apply at 10 - 50% bloom for suppression or early and mega (90%) bloom for control or canola.
	Black leg (Leptosphaeria maculans)	1.0 - 1.65 oz.	Apply at the 2 - 4 leaf stage.
	Suppression of white mold (Sclerotinia sclerotiorum)	1.65 oz.	Apply at 10 - 50% bloom for suppression.
Sunflowers	Suppression of ball rot (Rhizopus humanifer)	1.65 oz.	For optimal disease suppression, apply prior to disease development.

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Proline 430 SC

Formulation

Prep, Process Instruction Data and Testing

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Registered Card Offers

[illegible]

Applicable Information

[illegible]

Keep it Handy

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Application Use

[redacted]

Restrictions

[redacted]

Environmental Precautions

[redacted]

Toxicity

[redacted]

Storage

[redacted]

Properties

[redacted]

Formulations

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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Foreign Allowance Controlled Water and Packing

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Registered Trial Effects

[redacted]

Application Information
How to Apply Ground equipment only. Do not apply by air. **Water Volume** 40 L/acre minimum.

How It Works
Propulse is a broad spectrum fungicide with preventative, systemic, and curative properties recommended for the control of certain crop diseases.

Application Tips
Use sufficient water volume and spray pressure to provide thorough, uniform coverage for optimum disease control.

Restrictions
Do not apply more than 0.6 L of Propulse per acre per season.
Pre-harvest Interval Do not apply within 14 days of harvest of seed. **Grazing** Do not graze treated area, and do not harvest for forage or hay. **Re-entry** Do not re-enter treated fields until 24 hours post-application. **Re-cropping** 30 hours, chickpeas and lentils may be replanted immediately following the last application of Propulse. Following 30 hours, the following crops may be planted 30 days after the last application of Propulse: alfalfa, canola, cereal grains, corn, potato, soybean and watermelon. Do not rotate to any other crop.

Environmental Precautions
Propulse is toxic to birds and aquatic organisms. Observe buffer zones specified in the label. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment washwaters.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage
Store in a cool, dry place. Store in original container. Do not store at temperatures below freezing.

Prosaro 250 EC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prosaro 250 EC (PCP# 29821)	Bayer Crop Science	Prothioconazole 125 g/L tebuconazole 125 g/L	Emulsifiable concentrate	0.5 L, 1 L, 10 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific use restrictions
Wheat	Leaf, stem and stripe rusts (*Puccinia recondita, P. graminis, P. striiformis*), leaf blotch (*Septoria tritici*), glume blotch (*Stagonospora nodorum*), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis*), fusarium head blight suppression (*Fusarium* spp.)	220 mL	For optimum suppression of fusarium head blight apply when 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads are in flower. For other diseases apply at the first sign or very early stage of disease, especially if weather conditions favour disease development. Apply up to the end of the flowering stage.

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Crops	Diseases	Rate per acre	Timing and specific use restrictions
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), leaf blotch (*Septoria passerinii*), spot blotch (*Cochliobolus sativus*), leaf, stem and stripe rusts (*Puccinia hordei*, *P. graminis*, *P. striiformis*), powdery mildew (*Erysiphe graminis*), fusarium head blight (suppression) (*Fusarium* spp.)	325 mL	For optimum suppression of fusarium head blight apply when 70 - 100% of the main stem heads are fully emerged up to 3 days after full head emergence. For other diseases apply at the first sign or very early stage of disease, especially if weather conditions favour disease development. Apply up to the end of the flowering stage.
Oats	Crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*), Stagonospora (*Septoria*), leaf blotch and black stem (*Stagonospora avenae syn. Septoria avenae*)	325 mL	Apply when the earliest disease symptoms appear on the leaves and stems. Fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted or under prolonged conditions favourable for disease development.

Registered Tank Mixes

Bayer CropScience supports the tank mix of Prosaro 250 EC and Lontrel. Apply this mix according to the most restrictive use limitations for either product.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 40 L/acre minimum. Aerial: 20 L/acre minimum.

Application Tips

Spray coverage is essential. Ensure thorough coverage of all wheat or barley heads for optimal suppression of fusarium head blight. Best results are achieved from forward to backward facing nozzles.

How it Works

Prosaro 250 EC is a broad spectrum fungicide for disease control in cereals with protective and curative properties.

Restrictions

A maximum of one application may be applied per crop season.

Re-cropping: None. **Re-entry**: Do not enter fields for 12 hours after application. **Grazing**: Do not allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. **Pre-harvest Intervals**: Wheat, barley: 36 days.

Environmental Precautions

Toxic to birds, small animals, aquatic organisms and non-target plants. Do not apply this product directly to freshwater habitats. Observe buffer zones. See label for specific details on buffer zones.

Toxicity

Oral LD_{50} (female rats) > 2,000 mg/kg.

Storage

Do not store at temperatures below freezing. If stored for 1 year or longer, shake well before using.

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Quadris

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quadris (PCP# 26153)	Syngenta	Azoxystrobin: 250 g/L	Suspension	3.78 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Staging and specific comments
Canola	Virulent blackleg (*Leptosphaeria maculans*)	202 mL	Apply at the 2 - 6 leaf stage. Maximum of 2 applications per season.
	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	283 - 404 mL	Apply at the early bloom stage (prior to 30% bloom). Use the higher rate if there is a history of Sclerotinia infection in the area, and when environmental conditions favour disease development.
	Alternaria black spot (*Alternaria brassicae, Alternaria raphani*)	202 mL	Apply at the pod stage (90% petal fall).
Chickpea	Ascochyta blight (*Ascochyta* spp.)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a 2nd application 10 - 14 days later. Maximum of 2 applications per season.
Corn	Rust (*Puccinia sorghi*)	183 mL in 80 L of water/acre.	Apply prior to disease establishment and subsequently at a 7 - 14 day interval. Apply a maximum of 2 applications per season.
Lentils	Anthracnose (*Collectotrichum truncatum*), Ascochyta blight (*Ascochyta* spp.), Asian bean rust (*Phakopsora* spp.)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a 2nd application 10 - 14 days later. Maximum of 2 applications per season.
Peas/beans	Anthracnose Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella pinodes*), powdery mildew* (*Erysiphe pisi*), Asian bean rust (*Phakopsora pachyrhizi*)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a 2nd application 10 - 14 days later. Maximum of 2 applications per season.
Potatoes (foliar)	Early blight (*Alternaria solani*)	202 - 324 mL	For early blight, use the high rate and short application interval under high disease pressures. If late blight becomes established, discontinue use of Quadris and use alternative fungicides.
	Late blight (*Phytophthora infestans*)	324 mL	
	Black dot (*Colletotrichum coccodes*)	500 - 800 mL	Apply on a 7 - 14 day interval, starting prior to disease establishment.
Potatoes (in furrows)	Silver scurf (*Helminthosporium solani*)	4 - 6 mL product/ 100 m row	Apply once as an in furrow spray in 20 - 56 L/acre. Mount the spray nozzle so the spray is directed into the furrow as a 15 - 20 cm band just before the seed is covered. Maximum of 2 applications per season.

* Field peas only

Registered Tank Mixes

Always read all the labels and follow the precautionary statement, directions for use (rates, diseases controlled and application intervals) and other restrictions.

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Tank mixture partner	Diseases/insects controlled	Rate	Specific comments
Bravo 500 Potatoes (foliar)	Early blight	Quadris at 202 mL/acre **Plus** Bravo 500 at 808 mL/acre	Do not apply more than 3 applications of this tank mix per season. Pre-harvest interval: 2 days.
Quadris Plus Ridomil Gold (potatoes - in furrows)	Rhizoctonia stem and stolon canker, black scurf and the suppression of pink rot	Quadris at 4 mL/100 m row **Plus** Ridomil Gold at 4 mL/100 m row	Do not apply more than one application per season. Pre-harvest interval: 90 days. A plant-back interval of 30 days for potatoes (root crops) is required.
Quadris Plus Ridomil Gold Plus Actara (potatoes - in furrows)	Rhizoctonia stem and stolon canker, black scurf, pink rot (suppression only), Colorado potato beetle, potato leafhopper, aphids	Quadris at 4 - 6 mL/100 m row **Plus** Ridomil Gold at 4 mL/100 m row **Plus** Actara at 3.4 - 4.4 mL/100 m row	Do not apply more than one application per season. Pre-harvest interval: 90 days. Do not follow a soil application of Actara with a foliar application of Actara.
Matador 120 EC	All diseases with Quadris applied at 202 mL/acre PLUS Insects: all insects currently registered on the Matador 120EC label.	Quadris at 202 mL/acre **Plus** Matatdor at 26 - 51 mL/acre	Do not apply more than 2 applications of this tank mix per season. Pre-harvest interval:15 days for vegetables, 14 days for corn, 30 days for all others including soybeans. Do not apply by air.
Tilt (barley)	Barley net blotch (Pyrenophora teres), barley scald (*Rhynchosporium secalis*), barley leaf rust (*Puccinia hordei*)	Quadris at 90 mL/acre **Plus** Tilt at 202 mL/acre	Do not make more than one application per season of this tank mixture. An additional application of Tilt can be made, if required. Do not harvest wheat for forage. Do not graze or feed livestock treated forage or cut green crop for hay or silage. Pre-harvest interval 45 days.
Tilt (wheat and barley)	Septoria leaf spot (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*)		
Tilt (spring wheat, winter wheat and barley)	Stripe rust (*Puccinia striiformis*)	Quadris at 80 - 120 mL/acre **Plus** Tilt at 161 - 202 mL/acre	
Tilt (spring wheat and winter wheat)	Wheat leaf rust (*Puccinia triticina*)		

Application Information

How to Apply: Ground and aerial application. See label for application method of registered crops.
Water Volume: Ground: 40 L/acre minimum. In furrow treatment: 20 - 57 L/acre. Aerial: 18 L/acre minimum.

Application Tips

Good coverage is essential for effective disease control.

How it Works

Quadris fungicide is a broad spectrum, preventative fungicide with systemic properties.

Restrictions

Rainfall: Quadris alone can be applied 6 hours before rainfall. **Grazing**: Do not feed pea vine to livestock.
Pre-harvest Intervals (days): Canola (30), legumes (15), potatoes (foliar application) (1) potato (in furrow)(90).
Plant-back Intervals: Broadleaf and root crops – 30 days. Cereals – 45 days.

Environmental Precautions

This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff**: Avoid application to areas where runoff is likely to occur. **Leaching**: The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Heated storage required. Keep in original container. Store in a cool, dry, well ventilated area.

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Quadris Top

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quadris Top (PCP# 30518)	Syngenta	Azoxystrobin: 200 g/L Difenoconazole: 125 g/L	Suspension	10.125 L

Crops, Diseases, Timing and Application Information

Crop	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*), brown spot (*Alternaria alternata*), Black Dot (*Colletotrichum coccodes*)	229 - 404 mL	Apply prior to disease development. Apply no more than 1 application to target these diseases. If disease pressure is high, use the highest rate.
Sugar Beets	Cercospora leaf spot (*Cercosphora beticola*), Powdery mildew (*Erysiphe polygoni*)	229 - 404 mL	Apply on a 7 to 28-day schedule, alternating with a non-triazole fungicide that is registered for these diseases. If the disease rate is high, use the highest rate and shortest interval. Do not exceed 3 applications per year.

Application Information

How to Apply: Potato: Ground and aerial application. Sugar beets: Ground application only.
Water Volume: Ground: 60 L/acre minimum. Aerial: 18 L/ acre minimum.

Application Tips

Thorough coverage is essential for effective disease control.

How It Works

Quadris Top fungicide is a broad spectrum, preventative fungicide with systemic properties.

Restrictions

Rainfall: Do not apply when heavy rain is forecast. **Pre-harvest Intervals (days)**: potatoes (14), sugar beets (7). **Re-cropping**: A plant-back interval of 60 days is required following a Quadris Top application to the preceding crop unless Quadris Top and/or Inspire are registered for that crop.

Environmental Precautions

This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff**: Avoid application to areas where runoff is likely to occur. **Leaching**: The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry area.

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Quash

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quash (PCP# 30402)	Valent Canada Inc. distributed by Nufarm Agriculture	Metconazole: 50%	Water dispersible granules	280 g (4.48 kg per case)

Crops, Diseases, Timing and Application Information

Crop	Diseases	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	57 - 114 g	Apply a maximum of 114 g per acre between 20% and 50% bloom.
Dry bean	Suppression of white mould (*Sclerotinia sclerotiorum*)	114 g	Apply prior to disease development. Make first application at 20 - 50% bloom stage, before disease symptoms develop. Make a second application at full bloom. Do not make the second application until 7 days after the first application. Do not apply more than 228 g/acre per year.
Field pea	Powdery mildew (*Erysiphe pisi*) Suppression of white mould (*Sclerotinia sclerotiorum*)		
Chickpea	Suppression of ascochyta blight (*Ascochyta rabei*) and white mould (*Sclerotinia sclerotiorum*)		
Lentil	Suppression of ascochyta blight (*Ascochyta lentis*) and white mould (*Sclerotinia sclerotiorum*)		
Potato	Early blight (*Alternaria solani*) Suppression of white mould (*Sclerotinia sclerotiorum*)	70 - 114 g	Apply prior to infection for preventative control. If conditions favour disease development, make additional applications at 7 - 10 day intervals. Do not apply more than 340 g/acre per year.
Sunflower	Rust (*Puccinia helianthi*)	114 g	Apply when conditions favour disease development and prior to infection. Do not apply more than 228 g/acre per year.
	Suppression of Sclerotinia head rot (*Sclerotinia sclerotiorum*)	114 g	Make the first application preventatively at early to mid-bloom. A second application may be made at full bloom or 7 - 14 days later. Do not apply more than 228 g / acre per year.

Registered tank mixes

None registered.

Application Information

How to Apply: Ground and aerial application. **Water volume**: Ground: Sunflower 40 - 80 L/acre minimum. All other registered crops 80 L/acre minimum. Aerial: 20 L/acre minimum.

Application Tips

Apply Quash in sufficient water to ensure thorough coverage. Thorough coverage is required for optimal disease control.

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How it Works

Metconazole is a broad-spectrum triazole fungicide. Quash is systemic and is quickly absorbed into plant tissue. Metconazole can move up, but not down, in the plant.

Restrictions

Rainfall: Do not apply when heavy rain is forecast. **Pre-harvest Intervals**: Canola – 45 days. Dry bean, field pea, chickpea, lentil, sunflower – 21 days. Potato – 1 day. **Re-cropping**: Do not plant any other crop for a period of 30 days unless Quash is registered for that use.

Environmental Precautions

Toxic to aquatic organisms, non-target terrestrial plants, birds, and small wild mammals. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) = 1,750 mg/kg. Dermal LD_{50} (rabbits) = >5,000 mg/kg.

Storage

Store this product away from food or feed. Store in a cool, dry place.

Quilt/Blanket AP/Topnotch

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quilt (PCP# 28328)	Syngenta	Azoxystrobin: 75 g/L Propiconazole: 125 g/L	Suspension	10.125 L 101.25 L 405 L
ADAMA Azoxystrobin (PCP# 30489) (A component of Blanket AP)	ADAMA Canada	Azoxystrobin: 250 g/L	Suspension	4.8 L
Bumper 418 EC (PCP# 28017) (A component of Blanket AP)		Propiconazole: 418 g/L	Emulsifiable concentrate	4.8 L
Topnotch (PCP# 31126)	ADAMA Canada	Azoxystrobin: 143 g/L Propiconazole: 124 g/L	Suspension	9.6 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate			Timing and specific use restrictions
		Quilt (per acre)	Blanket AP* (per case)	Topnotch (per acre)	
Barley	Net blotch (*Pyrenophora teres*)	303 mL	50 acres	212 mL	Apply once between stem elongation and half-head emergence. Do not make more then 1 application per season. Pre-harvest interval: 45 days. When disease pressure from stripe rust, wheat leaf rust and other foliar diseases is expected to be high, the higher application rate of should be used.
	Leaf rust (*Puccinia hordei*)	404 mL	40 acres	212 mL	
	Stripe rust (*Puccinia striiformis*)	303 - 404 mL	40 - 50 acres	212 mL	

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Crops	Diseases	Rate			Timing and specific use restrictions
		Quilt (per acre)	Blanket AP* (per acre)	Tegrevitch (per acre)	
Wheat, barley, rye	Septoria leaf spot (Septoria sp.)	303 mL	50 acres	212 mL	Apply once between stem elongation and half-head emergence. Do not make more than 1 application per season. Pre-harvest interval: 45 days.
	Tan spot (Pyrenophora tritici-repentis)	303 mL	50 acres	212 mL	
	Scald (Rhynchosporium secalis)	303 mL	50 acres	212 mL	
Wheat (spring, winter)	Leaf rust (Puccinia triticina)	303 - 404 mL	40 - 50 acres	212 mL	When disease pressure from stripe rust and wheat leaf rust is expected to be high, the higher application rate of 404 mL/acre should be used.
	Stripe rust (Puccinia striiformis)	303 - 404 mL	40 - 50 acres	212 mL	
Oats	Crown rust (Puccinia coronata var. avenae)	303 - 404 mL	NR**	212 mL	Apply once between stem elongation and head emergence. Use high rate if field conditions favour disease development or if the field has a history of high disease pressure.
	Barley net blotch (Pyrenophora teres)	NR**	NR**	212 mL	
	Septoria leaf spot (Septoria sp.)	NR**	NR**	212 mL	
Triticale	Septoria leaf spot (Septoria sp.), tan spot (pyrenophora tritici-repentis)	303 mL	NR**	212 mL	
Corn (field, sweet, seed)	Rust (Puccinia sorghi), northern corn leaf blight (Setosphaeria turcicum), eye spot (Aureobasidium zeae), grey leaf spot (Cercospora zeae-maydis)	303 - 404 mL	NR**	NR**	Make first application at the first sign of disease; repeat at 14 days interval. Do not apply to field corn and field corn grown for seed after brown silk. Pre-harvest interval: forage corn – 30 days, sweet corn - 14 days. Do not make more than 2 applications per season.
Lentils, soybeans	Anthracnose (Colletotrichum truncatum)	404 - 606 mL	NR**	NR**	Make the first application at the first sign of disease. A second application at a 14 day interval may be needed if disease conditions persist.
Field pea	Mycosphaerella blight (Mycosphaerella pinodes)	404 - 600 mL	NR**	NR**	Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressure. A second application can be made 14 days after the first application if disease conditions persist.
Chickpea, lentil, field pea, soybeans	Asian rust (Phakopsora pachyrhizi)	404 - 606 mL	NR**	NR**	Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressures. Pre-harvest interval: field pea, lentil, chickpea, soybean – 30 days; succulent podded and shelled legume vegetables – 15 days.
	Powdery mildew	404 mL	NR**	NR**	
Canola	Blackleg (Leptosphaeria maculans)	404 mL	NR**	NR**	Apply at the rosette stage between 2 true leaves and bolting. One application per year. Pre-harvest interval – 30 days.
Soybeans	Frog eye leaf spot (Cercospora sojina)	404 - 606 mL	NR**	NR**	Make the first application at growth stage R3 (early pod set) and 14 days later at approximately growth stage R5.

*Blanket AP is a co-pack, use of both jugs is required when applying product. The 50 acre/case rate of Blanket AP is equal to Quilt at a 303 mL/acre rate. The 40 acre/case rate of Blanket AP is equal to Quilt at the 404 mL/acre rate. ** Not registered.

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Registered Tank Mixes

Product	Restrictions	Restrictions	Comments
SyG		Manatee 120 EC	
Tupersich	Axial, Grandstand, Oxidmethyl-propargyl, Sierra, Touchdown Total, Traxion	Manatee 120 EC, Silencer 120 EC	Quattro

Application Information

How to Apply. Ground and aerial application. **Water Volume.** Ground: 40 L/acre. Aerial: 28 L/acre minimum.

Application Tips

QuikShanker AP/Tupersich has some phytotoxic effects when mixed with products that are formulated as Emulsifiable Concentrate. In addition, adjuvants that contain some form of silicone may contribute to phytotoxicity. Do not apply during periods of dead calm. Avoid application when winds are gusty.

How it Works

QuikShanker AP/Tupersich consists of two fungicides, which have systemic properties and have different modes of action. They both have preventative and curative activity.

Restrictions

Rainfall. Avoid application when heavy rain is forecast. **Revegetating.** Do not rotate to any crop intended for food, grazing or any component of animal feed or bedding within 365 days of applying QuikShanker AP/Tupersich unless the second crop appears on the label.

Environmental Precautions

This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Azoxystrobin is persistent and will carryover. It is recommended that this product not be used in areas treated with Azoxystrobin during the previous season. **Runoff.** Avoid application to areas where runoff is likely to occur. **Leaching.** The properties of this product indicate it may leach to ground water. The use of this product may result in contamination of ground water, particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 1,750 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, well-ventilated area. Store above 0°C. Shake well before use.

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Rampart

[redacted]

Formulations

Product	Company	Active ingredient	Formulation	Container size
Rampart (PCP# 99999)	Loveland Products Canada Inc.	Mono and dipotassium salts of phosphorus acids	Solution	1 x 20 L

Crops, Diseases Controlled, Rates and Timing

Crop	Disease	Rate	Timing and specific use restrictions
Potatoes (post harvest)	Late blight (Phytophthora infestans), pink rot (Phytophthora erythroseptica)	Pre-re-potato storage: Mixed 100 mL in 1 litre of water. Apply 1 litre of this solution to 1000 kg of harvested potato as a spray or mist. Stored potatoes: Mixed 100 mL in 1 litre of water. Apply 1 litre of this solution per 1000 kg of stored potato tubers and water wash to post-harvest storage.	Maximum of 1 application per year to harvested potato tubers prior to storage or potato tubers in storage. Apply as soon as possible after harvest.
Potatoes (during foliar applications)	Suppression of late blight (Phytophthora infestans) and pink rot (phytophthora erythroseptica)	1.0 - 3.0 L/acre	Begin applications when conditions are favourable for disease development and continue on a 7 day interval. Use the higher rate when disease pressure is moderate or high. Do not make more than 5 applications in a season. Do not apply at intervals less than 5 days.

Registered Tank Mixes

None registered.

Application Information

Use to Apply: Pre-harvest applications: Soil-cable direct. Foliar applications: Ground and aerial application.
Water volume: Ground: 100 L/acre minimum. Aerial: 40 L/acre minimum.

Restrictions

Rainfall: Do not apply if heavy rainfall is imminent. **Growers:** Do not enter treated areas within 4 hours.

Environmental Precautions

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slopes, compacted soil or clay.

Toxicity

Oral LD_{50} = not established. Dermal LD_{50} = not established.

Storage

Store product away from food and feed.

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Ranman 4005C

[redacted]

Formulations

Product	Features	Active Ingredient	Formulation	Mixing with
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per Acre	Timing and Specific Use Instructions
[redacted]	[redacted]	[redacted]	[redacted]

Use [redacted]

Registered Tank Mixes

[redacted]

Application Information

[redacted]

Crop & Grubs

[redacted]

Restrictions

[redacted]

Environmental Precautions

[redacted]

Toxicity

[redacted]

Storage

[redacted]

[redacted]

[redacted]

[redacted]

Formulations

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Crops, Diseases Controlled, Rates and Timing

Crop	Diseases	Rate	Notes on Use and Restrictions
[redacted]	[redacted]	[redacted]	[redacted]

Registered Bulk Mixes

[redacted]

Application Information

[redacted]

Application Tips

[redacted]

Crop Safety

[redacted]

Restrictions

[redacted]

Environmental Precautions

[redacted]

Toxicity

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Storage

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Rovral Flo/Overall 240SC

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rovral Flo (PCP# 29310)	FMC of Canada	Iprodione 240 g/L	Suspension	0.4 L, 4000 L
Overall (29502, PCP# 35576)	ADAMA Canada	Iprodione 240 g/L	Suspension	0.4 L, 100.0 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Alfalfa (seed production)	Sclerotinia (*Sclerotinia sclerotiorum*)	1.00 - 1.25 L	Apply when the crop is in the 20 - 50% bloom stage. The high rate is recommended for fields with a history of severe disease pressure and dense crop stands.
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	Single application: 1.00 - 1.25 L	Apply at 20 - 50% bloom. For best results, apply at 20 - 30% bloom (prior to petals beginning to fall). The use of the higher rate on the first application is recommended for fields with a history of severe disease pressure and dense crop stands. Do not make more than 2 applications per season.
		Split application*: 0.40 - 0.63 L/acre at 20% bloom followed by 0.40 L/acre at 50% bloom.	
		Single application for low disease pressure: 0.63 L/acre	
	Alternaria black spot (*Alternaria brassicae* and *A. raphani*)	Single application: 1.00 L	Apply at early green pod stage*. Do not make more than 2 applications per season.
		Split application*: 0.40 L/acre at 20 - 50 % bloom followed by 0.40 L/acre at the early green pod stage	

* Early green pod stage: Almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground and aerial application. **Water Volume:** Ground: 40 L/acre. Aerial (canola only): 10 L/acre minimum.

How It Works

The active ingredient iprodione protects canola and alfalfa against sclerotinia stem rot and alternaria black spot in canola.

Restrictions

Rainfall: Do not spray in heavy dew or when rain is imminent. **Grazing:** Treated alfalfa vegetation is not to be used for animal feed. **Pre-harvest Interval:** 14 days.

Environmental Precautions

Do not apply directly to water. Overspray or drift to sensitive habitats should be avoided. Do not contaminate sensitive areas through direct application, drift or disposal of waste or cleaning equipment.

Toxicity

Oral LD_{50} (male rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 2,000 mg/kg.

Storage

Store above 0°C.

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Scala SC

Group 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
Scala (PCP# 28818)	Bayer CropScience	Pyrimethanil: 400 g/L	Suspension	2 L, 10 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potatoes	Early blight (*Alternaria solani*)	Scala SC must be applied in tank mix with Bravo 500. Scala SC at 300 mL PLUS Bravo 500 at label rate	Apply when plants are 15 - 20 cm high or when environmental conditions are conducive to disease development. Repeat applications at 7 - 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7-day interval. A maximum of six applications per year.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 120 L/acre. Aerial: 14 L/acre.

Caution: Do not apply more than 2.4 L/acre in a single growing season.

Application Tips

Thorough coverage of all plant parts to be protected is essential for good disease control.

How it Works

Scala SC is a systemic fungicide that is effective on early blight. Scala SC is best suited for use in a preventative treatment program.

Restrictions

Rainfall: Do not apply if heavy rain is forecast. **Pre-harvest Intervals**: Potatoes 7 days. **Re-cropping**: Wheat may be planted 30 days following the application of Scala SC. For all other crops not listed on the Scala SC label, a plant-back interval of 130 days must be observed.

Environmental Precautions

This product is toxic to aquatic organisms. For ground application, maintain a 1 metre buffer zone between areas sprayed and aquatic systems. For aerial application in potatoes, maintain a 10 m buffer zone between areas sprayed and aquatic systems. **Runoff**: Do not apply where runoff likely to occur. Do not apply this product through any type of irrigation systems.

Toxicity

Oral LD_{50} (male rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store above 0°C. Do not store near feed or foodstuffs.

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Senator 70 WP

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Senator 70 WP (PCP# 25343)	Nippon Soda Co. Ltd	Thiophanate-methyl: 70 %	Wettable powder	2 kg

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Beans, white	White mold (*Sclerotinia sclerotiorum*)	709 - 910 g	Apply when conditions favouring development of disease exist. This usually occurs during the early stages of bloom prior to the rows closing in. If disease conditions persist, repeat applications may be warranted.
Sugar beets	Leaf spot (*Cercospora* sp.)	170 - 227 g	Apply when disease first appears. Repeat 14 - 21 days later if required. Make a maximum of two applications per growing season. Pre-harvest Interval: 21 days. For sugar beets grown for export only.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground equipment (sugar beets and white beans) or aerial (white beans only).
Water Volume: Ground: 404 L/acre. Aerial: 20 - 24 L/acre.

How it Works

Senator 70 WP is a systemic fungicide for control of certain fungus diseases such as white mold and leaf spot.

Restrictions

Grazing: Do not feed or allow livestock to graze on treated crops. No sugar beets or parts of sugar beets are to be used as fodder or feed.

Environmental Precautions

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Observe the buffer zones specified on the label. Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift.

Toxicity

Ingestion: Oral LD_{50} (rats) technical = >5,000 mg/kg (male).

Storage

Store in a dry place at room temperature.

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Serenade CPB

Group 44/Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
Serenade CPB (PCP# 30143)	Bayer CropScience	*Bacillus subtillis* 1 x 10^9 CFU/g	Suspension	9.46 L, 500 L, 1000 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Beans, chickpea, lentil, pea (all types)	Botrytis blight (*Botrytis cinerea*) Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	1.6 - 6.0 L	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on 7 - 10 day intervals.
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	0.4 - 1.6 L	Begin application at 20% to 30% bloom. A second application may be made 7 - 10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure.
Soybean	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	1.6 - 6.0 L	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on 7 - 10 day intervals.
	Brown spot (*Septoria glycines*) Frog eye (*Cercospora sojina*)	0.4 - 1.6 L	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on 7 - 10 day interval.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 40 L/acre. Aerial: 20 L/acre

How it Works

Serenade CPB is a broad spectrum, preventative biofungicide for the suppression of plant diseases. It may be applied as a foliar spray alone or in an alternating spray program with other registered crop protection products.

Restrictions

Pre-harvest Intervals: Serenade CPB can be applied up to and including the day of harvest.

Environmental Precautions

Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wash water.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Product can be stored below 25°C for up to 3 years. Do not freeze.

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Serenade SOIL

Group 44

Formulation

Product	Company	Active ingredient	Formulation	Container size
Serenade SOIL (PCP# 30647)	Bayer CropScience	*Bacillus subtillis* 1 x 10^9 CFU/g	Solution	9.46 - 1,000 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate	Timing and specific comments
Legume vegetables, bean (*Lupinus* spp., *Phaseolus* spp. and *Vigna* spp.), chickpea, lentil and pea (all types)	Fusarium root rot (*Fusarium* spp.), Pythium root rot (*Pythium* spp.), Rhizoctonia root rot (*Rhizoctonia solani*)	1.1 - 5.7 L per acre	Serenade SOIL is a broad-spectrum, preventative biofungicide to suppress many important plant diseases. When conditions are conducive to heavy disease pressure, use Serenade SOIL in a rotational program with other registered fungicides.
Potato (post harvest)	Silver scurf (*Helminthosporium solani*)	85 - 175 mL per tonne	For post-harvest application to aid in the control of silver scurf. Prepare the equivalent of 5 - 10 liters of Serenade SOIL in 100 liters of water. Spray 2 liters of the Serenade SOIL/water suspension per tonne of potatoes.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. Ground: 40 L/acre minimum.

Application Tips

Broadcast or Band: Apply as a 15-cm band over the top of the seed row or as a broadcast spray after planting. Use higher rates for broadcast applications. Ensure incorporation into the seed zone within 24 hours of applications with rain or overhead irrigation. **Overhead irrigation**: Apply with irrigation water, ensuring uniform coverage of the soil and incorporation of product into the seed zone. **Surface drip irrigation**: Apply product with the first irrigation after planting. **Post-planting applications at any crop stage**: Apply the finished spray mixture to the soil as a drench, spray or drip irrigation, directing it towards the base of the plant.

How it Works

Bacillus subtilisis a bacterium that works as a bio-fungicide to prevent infection of labeled disease by multi-site biochemical activity.

Restrictions

Pre-harvest Interval: Serenade SOIL can be applied up to and including the day of harvest.

Environmental Precautions

Do not contaminate irrigation or drinking water supplies or aquatic habitat by cleaning of equipment or disposal of wash water.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rabbits) > 5,000 mg/kg.

Storage

Maximum storage period of two years at room temperatures up to 25°C.

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Stadium

Group 3, 11, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Stadium (PCP #31050)	Syngenta	Azoxystrobin: 143 g/L Difenoconazole: 112 g/L Fludioxynil: 143 g/L	Suspension concentrate	10 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate	Timing and specific comments
Potatoes	Fusarium dry rot (*Fusarium* spp.) Silver scurf (suppression) (*Helminthosporium solani*)	32.5 mL per tonne	Final spray solution of Stadium and water should deliver an application rate of 2 L per metric tonne of potatoes. Ensure proper coverage of the tubers. Tubers should be tumbling as they are treated.

Application Information

How to Apply: In-line aqueous spray application. See label for detailed mixing instructions.

How it Works

Stadium helps control the spread of pathogens to preserve tuber quality. Three active ingredients deliver multiple modes of action to support broad-spectrum disease control and resistance management.

Restrictions

Maximum Residue Limits (MRLs) in potato products for export to a number of countries outside North America have been established for the active ingredients in Stadium; however, they are not harmonized with North American levels. Prior to application, growers are advised to check with their potato buyer regarding Stadium use. It should also be noted that Stadium is NOT registered for use on seed potatoes.

Environmental Precautions

This product is toxic to fish and aquatic invertebrates. Do not apply directly to water. Do not allow contaminated waste water from the processing areas to enter lakes, streams, ponds or other waters. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) > 550 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place.

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Stratego 250 EC

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Stratego 250 EC (PCP# 27528)	Bayer CropScience	Propiconazole: 125 g/L Trifloxystrobin: 125 g/L	Emulsifiable concentrate	8 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Soybean	Asian soybean rust (*Phakopsora pachyrhizi*)	202 mL	Begin application preventatively from early flowering (R1) to complete podfill (R5) when risk of rust is high.
	Frogeye leaf spot (*Cercospora sojina*)		Spray between R3 and R4 (early pod fill) or when first symptoms appear. Maximum 2 applications per season.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 40 - 80 L/acre. Aerial: 20 L/acre minimum.

How it Works

Stratego contains two active ingredients providing both preventative and systemic activity resulting in sustained residual protection.

Restrictions

Rainfall: If rainfall occurs within one hour of application, re-application may be necessary. ***Grazing***: If one application per season is applied do not allow livestock to graze within the treated area within 30 days. If two applications per season are applied, do not allow livestock to graze within the treated area and do not harvest the treated crop for forage or hay. **Pre-harvest Intervals**: Soybean: 20 days. **Re-cropping**: Treated areas may be replanted immediately following harvest with any crop listed on the label. For crops not listed on the label, do not plant back within 30 days of last application.

Environmental Precautions

Stratego 250 EC is toxic to fish and other aquatic organisms. Do not contaminate water by cleaning of equipment or disposal of wastes. Observe the buffer zones specified on the label. **Runoff**: Do not apply to areas where runoff is likely to occur. **Leaching**: Residues of this product demonstrate the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the depth to the water table is shallow, may result in groundwater contamination.

Toxicity

Oral LD_{50} (male rats) = > 4,757 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage

Store container in a cool, dry place. Keep product in original container. Protect from freezing.

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Tanos 50 DF

Group 11, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tanos 50 DF (PCP# 33928)	E.I. duPont Canada	Famoxadone: 25% Cymoxanil: 25%	Dry flowable	3.4 kg

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potatoes	Early blight (Alternaria solani), late blight (Phytophthora infestans)	227 - 340 g	A minimum 12 day application window must pass between the 1st and 2nd application of Tanos 50 DF fungicide. A minimum 24 day application interval must pass between the 2nd and 3rd application of Tanos 50 DF Fungicide. Fungicides other than Tanos 50 DF may be used as necessary to protect the crop during these intervals. Do not apply Tanos 50 DF Fungicide to more than 247 ac/day. Apply no more than 3 applications per year.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. May be applied with ground sprayers or air-assisted sprayers. Do not apply by air. **Water Volume**: Use 100 - 120 L/acre water volume with conventional sprayers. Use a minimum of 44 L/acre water volume with air assisted sprayers.

Application Tips

Tanos 50 DF must not be applied to any crop suffering from stress as a result of drought, waterlogging, low temperatures, insect attacks, nutrient or lime deficiency or other factors reducing crop growth.

How it Works

Tanos 50 DF is both a protectant and locally systemic fungicide containing two different modes of action.

Restrictions

Rainfast: Tanos 50 DF fungicide rapidly penetrates into plant tissues and is rainfast within 1/2 hours after application. **Re-cropping**: Crops that are on the Tanos 50 DF label may be planted back at any time; cereal grains may be planted back following a minimum plant-back interval of 30 days, and all other crops may be planted back following a minimum plant-back interval of one year. **Re-entry**: Do not re-enter treated areas within 24 hours of application. **Pre-harvest Interval**: 14 days.

Environmental Precautions

Tanos 50 DF is toxic to fish and other aquatic organisms. This product is toxic to birds and wild mammals and is harmful to beneficial arthropods, such as predators and parasitoids. Observe buffer zones specified on the product label. **Runoff**: Do not apply to areas that are vulnerable to runoff. If rainfall is imminent, delay spraying.

Toxicity

Famoxadone: Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Cymoxanil: Oral LD_{50} (rats) = > 960 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Storage

Store product closed in original container only. Protect against humid air and water.

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Tattoo C

Group 3 + M

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Tattoo C (PDP# 39849)	Bayer CropScience	Propamocarb hydrochloride 375g/L Chlorothalonil 375 g/L	Suspension	5 L

Crops, Diseases Controlled, Rates and Timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potatoes	Late blight (*Phytophthora infestans*)	1.25 L	Begin applications when conditions are favourable for disease, but before infection, and continue at 7 - 14 day intervals until the threat of disease is over. Use the 7 day interval when the risk and conditions for disease are high. Do not apply more than 3 applications per season. Pre-harvest interval: 7 days.

Registered Tank Mixes

None registered.

Application Information

How to Apply: Ground application only. Do not apply by air. **Water Volume:** Ground: 80 - 120 L/acre.

Caution: Do not allow spray mixture to remain in tank overnight or for long periods during the day without agitation.

Application Tips

Thorough spray coverage of all plant material particularly lower stems is required. If multiple fungicide applications are required, rotation with other fungicide products is recommended. Where possible, Tattoo C should be applied in alternation with a fungicide having a different mode of action. Treatments with any product containing chlorothalonil must be separated by a minimum of 7 days.

How it Works

Tattoo C is a fungicide that combines the systemic action of propamocarb hydrochloride with the contact activity of chlorothalonil to give protection against late blight of potatoes. Propamocarb hydrochloride only moves upward in the plant, so it is essential to ensure coverage of the lower portions of the plant.

Restrictions

Grazing: Do not feed treated crops to livestock. **Re-cropping:** Do not plant a new crop in the treated area within 120 days of the last application. **Re-entry:** Do not re-enter treated areas within 48 hours after treatment.

Environmental Precautions

This product is toxic to fish, aquatic invertebrates and marine/estuarine organisms. Do not apply directly to water and to areas where surface water is present. Do not apply this product through any type of irrigation system. Do not contaminate water when disposing of equipment washwaters. A buffer zone of 15 metres should be observed around bodies of water in order to protect aquatic organisms from drift. **Runoff:** Do not apply where runoff is likely to occur.

Toxicity

Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rabbits) = > 4,000 mg/kg.

Storage

Cannot be stored below freezing. Keep away from fire or open flame or other sources of heat. If stored for 1 year or longer, shake well before using.

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Tilt 250 E/Bumper 418 EC/Pivot 418 EC/ Propel/Nufarm Propiconazole Fungicide

[redacted]

Formulations

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Crops, Diseases Controlled, Rates and Timing

Crop	Diseases	Rate per hectare		Timing
		[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]			
[redacted]	[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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[illegible]

[illegible]

[redacted]

Resistance

Recommendations

Groups, Microbes, Controlled Vibrio, and Drugging

Organisms Used in Mixes

[illegible]

Qualifying Considerations

[illegible] Single Follow [illegible]

Qualifying Tips

[illegible]

Data Collected

[illegible]

Recommendations

[illegible]

Environmental Precautions

[illegible]

Security

[illegible]

Storage

[illegible]

[redacted]

Registered Tank Mixes
None registered.

Application Information
How to Apply: Ground and aerial application. **Water Volume:** Ground: 67 L/acre. Aerial: 16 L/ acre.

Application Tips
Use sufficient water to obtain thorough coverage of plants. Do not apply under periods of dead calm. Avoid application of this product when winds are gusty.

How it Works
The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and curative properties recommended for foliar and soil-borne plant diseases.

Restrictions
Rainfall: Rainfast 30 minutes after application. **Grazing:** Do not graze until 14 days after application. **Pre-harvest intervals** (days): Canola, dry legumes (21); soybean, sunflower (14); corn, potatoes (7); cereal grains – no restriction. **Re-entry:** Do not re-enter treated area until 12 hours after application. **Re-cropping:** Refer to label for information on re-cropping restrictions. **Maximum Number of Applications:** Do not exceed 2 consecutive applications of this product before switching to a fungicide with a different mode of action. Maximum seasonal use rate: Canola, dry legumes, soybean: 1.2 L/acre; cereal grains, corn: 1.6 L/acre; sunflower: 1.8 L/acre.

Environmental Precautions
This product is toxic to fish. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when cleaning equipment or disposing of equipment wash waters or rinsate. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. Overspray or drift to sensitive habitats must be avoided. A buffer zone is required; refer to Directions For Use on Vertisan product label for buffer zones.

Toxicity
Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only. Keep in a dry, cool and well-ventilated place. Avoid extreme heat or cold.

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Zampro

Group 40, 45

Formulation

Product	Company	Active ingredient	Formulation	Container size
Zampro (PCP# 30321)	BASF Canada	Amectoctradin: 300 g/L Dimethomorph: 225 g/L	Suspension	4.14 L

Crops, Diseases, Timing, and Application Information

Crops	Diseases	Rate per acre	Timing and specific comments
Potatoes	Late blight (*Phytophthora infestans*)	0.32 - 0.40 L	Begin applications prior to disease development. Repeat applications on a 5 - 10 day interval. Use the higher application rate and shorter interval when disease pressure is high. Do not make more than 2 sequential applications of Zampro before alternating to a fungicide with a different mode of action. Do not exceed 3 applications per season.
	Tuber blight (*Phytophthora infestans*)	0.40 L	Application of Zampro immediately prior to or after vine kill helps reduce tuber blight.

Application Information

How to Apply: Ground and aerial application. **Water Volume**: Ground: 80 L/acre. Aerial: 20 L/ acre.

How It Works

Zampro consists of two fungicides. Amectoctradin is a non-systemic and preventative compound. It acts on pathogen cells by interfering with their respiration process. Dimethomorph is a systemic fungicide with protective activity. It acts as a lipid synthesis inhibitor.

Restrictions

Grazing: No restrictions listed. **Pre-harvest Interval**: Do not apply within 4 days of harvest. **Re-entry**: Do not enter treated areas for 12 hours after application. **Re-cropping**: A plant-back interval of 30 days is required for all crops not listed on the label.

Environmental Precautions

This product is toxic to aquatic organisms. Observe buffer zones specified on the label. **Runoff**: Do not apply to areas where runoff is likely to occur. Avoid application to areas with moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (rats) = > 500 - 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container in a secure, dry area. Do not allow product to freeze.

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Fungicide – Foliar Treatment Selector Chart

Barley, Wheat, Oats and Rye

Crop	Barley															Wheat													
Products	Acapela	Bumper/Pivot/Tilt/Propel	Caramba	Evito	Folicur 250/Fusie/Palliser	Headline EC	Priaxor	Proline 480 SC	Prosaro	Quilt/Blanket AP/Topnotch	Stratego	Twinline	Vertisan	Acapela	Bravo 500	Bumper/Pivot/Tilt/Propel	Caramba	Evito	Mancozeb –based products*	Folicur 250/Fusie/Palliser	Headline EC	Priaxor	Proline 480 EC	Prosaro	Quilt/Blanket AP	Stratego 250 EC	Twinline	Vertisan
Fusarium head blight			S					S	S						S		S			S			S	S				
Leaf rust		C	C	C	C				C	C				C		C	C	C	C	C	C	C	C	C	C	C	C	C
Glume blotch															C	C							C	C				
Net blotch		C	C	C	C	C	C	C	C	C	C	C																	
Powdery mildew	C	C			C				C					C		C		C		C	C	C		C		C	C	
Scald		C	C		C	C	C	C	C	C	C	C																	
Septoria leaf spot		C								C			S		C	C	C				C	C			C		C	S
Septoria leaf blotch	C				C				C		C			C				C	C				C	C		C			
Spot blotch		C	C		C	C	C	C	C	C	C	C								C	C	C					C		
Stem rust		C		C	C				C				C			C		C		C				C		C		C
Stripe rust				C	C	C	C		C	C		C				C		C		C	C	C		C	C	C	C		
Tan spot														C	C	C	C		C	C	C	C	C	C	C	C	C		
Crown rust																													

C = Control, S = Suppression

(continued)

* Mancozeb based products are Dithane DG 75, Manzate 200, Manzate 75 DF, Manzate Pro stick, Pencozeb 75 DF, Pencozeb 80 WP

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Fungicide – Foliar Treatment Selector Chart

Barley, Wheat, Oats and Rye (*continued*)

Crop	Oats													Rye					
Products	Acapela	Bumper/Pivot/Tilt/Propel	Caramba	Headline	Folicur 250/Fuse/Palliser	Proline	Priaxor	Quilt	Stratego 250 EC	Topnotch	Twinline	Vertisan		Acapela	Headline EC	Caramba	Priaxor	Twinline	Vertisan
Fusarium head blight			S													S			
Leaf rust														C	C	C	C	C	C
Glume blotch																			
Net blotch										C									
Powdery mildew	C													C	C		C	C	
Scald																			
Septoria leaf spot									C	C									
Septoria leaf blotch		C	C											C					
Spot blotch																			
Stem rust					C							C							
Stripe rust																			
Tan spot																			
Crown rust		C	C	C	C	C	C	C	C		C								

C = Control, S = Suppression

* Mancozeb-based products are Dithane DG 75, Manzate 200, Manzate 75 DF, Manzate Pro-stick, Pencozeb 75 DF, Pencozeb 80 WP

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Fungicide – Foliar Treatment Selector Chart

Canola, Mustard and Flax

Crop	Canola															Mustard			Flax		
Products	Acapela	Astound	Bumper/Pivot/Tilt/Propel	Contans WG	Exempla	Headline EC	Lance WDG/Lance AG	Priaxor	Proline 480 SC	Quadris	Quash	Rovral Flo/Overall 240SC	Seranade ASO	Vertisan	Exempla	Proline 480 SC	Priaxor	Headline EC	Priaxor	Proline 480 SC
Alternaria black spot					C	C	C	C		C		C			C		C			
Blackleg			C		C	C		C		C					C		C			
Pasmo																		C	C	
Sclerotina white mould	C	C		C	C		C	S	C	C	C	C	C	C		C	S		S	C

Corn, Alfalfa (grown for seed), Grasses (grown for seed) and Sugar Beets

Crop	Corn										Alfalfa						Grasses		Sugar beet							
Products	Acapela	Bravo 500	Bumper/Pivot/Tilt/Propel	Evito	Headline EC	Priaxor	Quadris	Quilt	Vertisan		Headline EC	Fontelis	Lance WDG/Lance AG	Mancozeb –based products*	Priaxor	Rovral Flo/Overall 240 SC	Headline EC	Priaxor	Headline EC	Mancozeb –based products**	Polyram DF	Priaxor	Quadris Top	Caramba	Senator 70 WP	Copper based products***
Northern leaf blight	C		C	C		C		C																		
Rusts		C	C	C	C		C	C	C																	
Gray leaf spot					C	C		C	S																	
Eye spot		C	C			S		C																		
Common leaf spot											C		C	C	C											
Spring black stem/leaf spot													C	C												
Sclerotina stem rot												C				C										
Leaf rust and stem rust																	C	C								
Powdery mildew																	C	S	C			C	C			
Cercospora leaf spot																			C	C	C	C	C	C	C	C

C = Control, S = Suppression

* Registered products include: Dithane DG 75, Manzate 75 DF, Manzate Pro-stick, Pencozeb 75 DG

** Registered products include: Dithange DG, Manzate DF, Manzate Pro-stick, Pencozeb 80 WP

*** Registered copper based products include: Coppercide WP, Parasol WG, Parasol WP

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Pulse Crops

Crop	Beans																
Products	Acapela	Allegro	Bumper/Pivot/Tilt/Propel	Contnas WG	Copper 53 W	Delaro 325 SC ****	Headline EC	Lance	Priaxor	Propulse	Quadris	Quash	Quilt	Serenade CPB	Senator 70 WP	Vertisan
Asian bean rust	C					C					C		C			S
Anthracnose					C		C		C		C					
Aschochyta blight										C	C					C
Bacterial blight					C											
Botrytis gray mould														C		C
Mycosphaerella blight							C			C	C					
Powdery mildew							C		C		C		C			
Downy mildew					C											
Rust			C				C		C							
Sclerotina white mold	S	C		C		S		C		C		S		C	C	

C = Control, S = Suppression

(continued)

* Only in lentil

** Only in chickpea

*** Registered products include: Dithane DG, Manzate DF, Manzate Pro-stick, Pencozeb 75 DF

**** Soybean only

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Fungicide – Foliar Treatment Selector Chart

Pulse Crops (*continued*)

Crop	Lentil/Chickpea																		
Products	Acapela	Bravo 500	Bumper/Pivot/Tilt/Propel	Delaro 325 SC	Elatus	Headline DUO	Headline EC	Lance AG	Lance WDG	Manzoseb-based products***	Priaxor	Priaxor DS	Proline 480 SC	Propulse	Quadris	Quash	Quilt	Serenade DFB	Vertisan
Asian bean rust	C		C												C		C		S
Anthracnose		C*		C*	C	C*	C*	C		C	C*	C*			C*		C*		
Aschochyta blight		C		C	C	C	C*	C	C	C*	C	C	C	C	C	S			C
Bacterial blight																			
Botrytis gray mould				C		C		C	C		S							C	C
Mycosphaerella blight					C									C					
Powdery mildew			C														C		
Downy mildew																			
Rust															C*				
Sclerotina white mold	S			C		C		C	C		S	S		C		S		C	

C = Control, S = Suppression

(*continued*)

* Only in lentil

** Only in chickpea

*** Registered products include: Dithane DG, Manzate DF, Manzate Pro-stick, Penncozeb 75 DF

**** Soybean only

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Fungicide – Foliar Treatment Selector Chart

Pulse Crops (continued)

Crop / Products	Peas																
	Acapela	Bravo 500	Bumper Power Tin Propel	Delaro 325 SC	Elatus	Headline EC	Kumulus DF	Lance 4SC	Lance WDG	Priaxor	Priaxor SC	Quadris	Quilt	Sercadis	Serenade DMJ	Veritas
Asian bean rust	C		C			C				C	C	C		C		S
Anthracnose																
Ascochyta blight		C		C	C			C	C			C				C
Bacterial blight																
Botrytis gray mould				C				C	C						C	C
Mycosphaerella blight	C			C	C	C		C	C	C	C	C				
Powdery mildew			C		C	C	C	C		C	C	C	C	C		
Downy mildew								S		S						
Rust																
Sclerotinia white mold	S			C						S	S		S		C	

C = Control, S = Suppression

* Only in lentil

** Only in chickpea

*** Registered products include: Echinex DG, Intercede DF, Intercede Pro stick, Pennycress 75 DF

**** Soybean only

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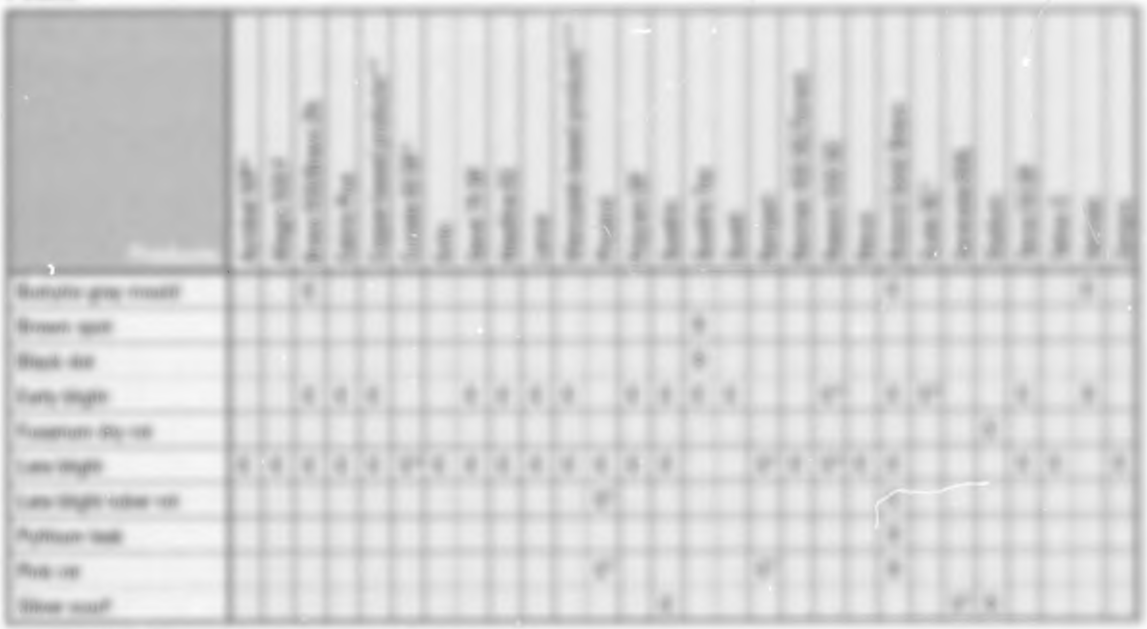
Fungicide – Foliar Treatment Selector Chart

Potato



2 = Control, 1 = Suppression

* Must not be used alone. Use only as a tank mixture.

** Copper based products are: Copper 53 W, Copper Spray, Kocide 2000 and Parasol and Cuprofix

*** Mancozeb based products are: Dithane DG Rainshield NT, Manzate 4F, Manzate Pro Stick, Dithane

† Control achieved with good harvest application.

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Pesticide Application Record

Field description: _____ Acres: _____ Crop: _____

Survey: _____ Date seeded: _____ Fertilizer: _____ Rate: _____ Date: _____

Crop stage: _____ Scouting date: _____ Date results were received: _____

Pest (Weed/Insect/Disease)		Severity				Results	Yield Program	
Species	Leaf stage / Notes/Symptoms	Plentiful	Low	Moderate	High			

Comments: _____

Application Information							Environment Information			
Pesticide used	Time until Reap	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stage	Soil moisture	Temp. celsius	Wind speed and direction
1. Lot #:							In Out In Out	In Out In Out		
2. Lot #:							In Out In Out	In Out In Out		
3. Lot #:							In Out In Out	In Out In Out		

Comments: _____

Key: In = Incubator E = Seed N = Net P = Pest

Applicator Signature: _____

Date of Application: _____

POISON CONTROL CENTRE
(ALBERTA)

Toll-free Alberta Wide
1-800-332-1414

Calgary Only
(403) 944-1414

Please caution if the Emergency Department of the hospital is your only (403) or (780)

When you call the Poison Centre

1. Remain calm
2. Bring the container and/or label with you to the phone
3. Be prepared to answer some questions:
   a. age and weight of patient
   b. name and amount of product
   c. time poisoning happened
   d. any symptoms
   e. circumstances surrounding the incident
   f. your name and phone number
4. Follow instructions carefully
5. Keep your line free in case Poison Centre has to phone you back
6. Do not attempt any additional first aid unless the Poison Centre has instructed you

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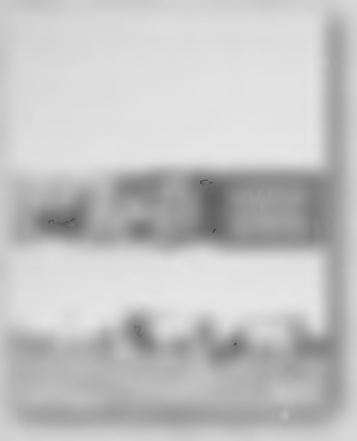
Issue Effects: Agriculture and Forestry